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ERRATA

Page	12	line 25	for '581'	read '380'
	22	3	,, 'bunt'	,, 'loose smut'
		8	,, 'bunt [*Tilletia caries* and *T. foetens*]'	,, 'loose smut [*Ustilago tritici*]'
	28	17	,, '109'	,, '209'
	29	30	,, '*A. avenae*'	,, '*U. avenae*'
	30	18 and 20	for 'Weber'	,, 'Wehmer'
	59	36	for '*herbarium*'	,, '*herbarum*'
	81	5	delete '*Ustilago penniseti*'	
	109	14	insert 'Brien (R. M.) & Chamberlain (E. E.)' after 'Neill (J. C.)'	
	167	17	for '*Blennaria*'	read '*Blennoria*'
	181	41	,, 'xi'	,, 'x'
	215	31	,, '*todschlidowskii*'	,, '*totschidlowskii*'
	217	35	,, 'became increasingly'	,, 'was'
	226	1	,, 'Hursch'	,, 'Hursh'
	275	40	,, 'Yamauti, Y.'	,, 'Yamauti, K.'
	296	32	,, '*alopercuri*'	,, '*alopecuri*'
	304	24	,, 'Cotton-rot'	,, 'Cotton root-rot'
	325	12	,, '1934'	,, '[1935]'
	346	6	,, '*Fusarium solani*'	,, '*Fusarium solani* var. *martii* (= *F. martii*)'
	348	36	,, '*schedonardi*'	,, '*schedonnardi*'
	449	15	delete 'another . . . latter'	
	457	32	for '*marionii*'	,, '*marioni*'
	462	16	,, 'xiv'	,, 'xiii'
	503	35	,, '596'	,, '496'
	592	32	,, 'xiii'	,, 'xiv'
	617	7	,, '*Mangina*'	,, '*Manginia*'
	669	14	,, '*langsdorfii*'	,, '*langsdorffii*'
	670	49	,, 'organisms'	,, 'cultures of *M. phaseoli*'
	702	41	,, '274'	,, '374'
	727	13	,, 'walnut'	,, 'chestnut'
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IMPERIAL MYCOLOGICAL INSTITUTE

REVIEW

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KOVAČEVSKI (I. C.). Черното гниене по Кръстоцвѣтнитѣ в България, **Bacterium campestre (Pammel) E. F. Smith.** [The black rot of crucifers in Bulgaria, *Bacterium campestre* (Pammel) E. F. Smith.] —*Journ. Agric. Exper. Stations in Bulgaria*, Sofia, vi, 3–4, pp. 25–39, 1934. [English summary.]

This is a brief morphological, biological, and cultural account of *Bacterium campestre* [*Pseudomonas campestris*: *R.A.M.*, xiii, p. 610], which was recorded for the first time in Bulgaria in 1931, causing a black rot of cabbage, cauliflower, kohlrabi, and rape. Control measures are briefly discussed.

HIURA (M.) & KANEGAE (H.). **Studies on the downy mildews of cruciferous vegetables in Japan I.**—*Trans. Sapporo Nat. Hist. Soc.*, xiii, 3, pp. 125–133, 1934.

It was shown by cross-inoculation experiments [the results of which are tabulated and briefly discussed] that the downy mildew (*Peronospora parasitica*) on radish does not attack cabbage (*Brassica oleracea* vars. *bullata* and *capitata*) and is only mildly parasitic on Chinese cabbage (*B. pekinensis*), *B. chinensis*, rape, and *B. juncea* [cf. *R.A.M.*, xii, p. 1]. Conversely, the form on *B. pekinensis* does not infect radish but is allied to one on *B. chinensis* and rape, the forms on *B. pekinensis*, *B. chinensis*, and rape being mutually infective to one another.

TOGASHI (K.) & SHIBASAKI (Y.). **Biometrical and biological studies of Albugo candida (Pers.) O. Kuntze in connection with its specialization.**—*Bull. Imper. Coll. of Agric. & Forestry* (Morioka, Japan), xviii, 88 pp., 1 fig., 6 graphs, 1934.

In continuation of their previous studies on the morphology of *Albugo candida* [*Cystopus candidus*], the agent of white rust of crucifers in Japan [*R.A.M.*, x, p. 556], the writers give a comprehensive, fully tabulated account of their biometrical examination of the conidia of the fungus from different hosts and of cross-inoculation experiments conducted with the various strains.

Two fairly distinct morphological forms were found to occur within the species, the name 'var. *macrospora*' being proposed to cover the strains parasitizing *Brassica* and *Raphanus* spp. and 'var. *microspora*'

for those on *Cardamine flexuosa*, *Capsella bursa-pastoris* var. *auriculata*, *Draba nemorosa* var. *hebecarpa*, and *Arabis hirsuta*. The conidia of the former group average 20 by 18 μ and those of the latter 15·5 by 14·5 μ. As a result of the cross-inoculation tests five well-marked biologic forms of the white rust were differentiated on (1) *C. bursa-pastoris* var. *auriculata*, (2) *D. nemorosa* var. *hebecarpa*, (3) *A. hirsuta*, (4) *R. sativus* var. *macropodus*, and (5) *B. cernua*, *B. chinensis*, *B. pekinensis*, and *B. rapa*.

PRESTON (N. C.). **The control of club root (finger and toe) in Cauliflowers.** —*Journ. Min. Agric.*, xli, 4, pp. 329–335, 2 pl., 1934.

In co-operative trials carried out at different centres in England and Wales in 1932 for the control of club root of cauliflowers (*Plasmodiophora brassicae*) in soils known to be heavily contaminated, mercuric chloride solution 1 in 2,000 [*R.A.M.*, xi, p. 17] was applied just before sowing at the rate of one pint to each 5 ft. of row under frames and at double this quantity in open seed-beds, followed by a second application of twice these amounts between the rows when the plants were 2 in. high; a third application was given before dibbling, ½ pint of the solution being applied to each hole before inserting the plants. In some of the tests only the first two treatments were given, and in others only the third.

The results obtained [which are tabulated and discussed] showed that the third treatment, if given to seedlings free from club root when planted out, in most cases gave crops over 70 per cent. of which were marketable. It is particularly suitable for areas where adequate rotation is difficult, but remains supplementary to the use of lime [ibid., xiii, p. 669]. Seed-bed infection can be controlled and a fair proportion of healthy seedlings raised by the two seed-bed treatments, but the need for the final treatment (when planting out) was clearly shown by some of the trials, in which from 84 to 100 per cent. of the plants treated only in the seed-bed clubbed heavily.

CROSIER (W.). **Black spot of germinating Pea seed.**—*Phytopath.*, xxiv, 7, pp. 827–829, 1 fig., 1934.

For several years past, and especially in 1933, commercial samples of peas, beans [*Phaseolus vulgaris*], and Lima beans [*P. lunatus*] examined at the seed-testing laboratory, New York (Geneva) Agricultural Experiment Station, have shown an extensive dull olivaceous to sooty-black spotting, particularly apparent at a germination temperature of 25° C. The black areas, measuring 1 to 5 mm. in diameter and numbering from 1 to 100 (generally 3 to 10) on a single seed, are composed of a superficial growth of the long, pluriseptate, hyaline, dark brown, or black, irregularly branched hyphae, 4 to 16 μ in diameter, of a member of the Dematiaceae, probably *Dematium* [*Pullularia*] *pullulans* [*R.A.M.*, xiii, p. 523]. Short-ovate to cylindrical, hyaline spores, 6·5 to 12·5 by 3·5 to 6·3 μ, develop on short sterigmata from the hyphae when placed in water. Green peas collected direct from the pods with sterilized forceps showed no sign of fungal contamination which must occur, therefore, during the various operations (grading, bagging, and the like) subsequent to harvesting and threshing. Inoculation experiments with the fungus on various parts of a number of pea and bean varieties gave negative results.

BREAZZANO (A.). **Alcune osservazioni sulle decisioni prese dalla Riunione di esperti tenutasi in Berlino nel 1930 per la discussione dei metodi di analisi tossimetrica delle sostanze conservatrici del legno.** [Observations on the decisions reached at a meeting of experts held in Berlin in 1930 to discuss methods of toximetric analysis of wood preservatives.]—*Boll. R. Staz. Pat. Veg.*, N.S., xiv, 2, pp. 185–201, 1934. [English summary.]

In this paper the author (who directs a wood-preservation laboratory of the Railway Section of the Royal Experimental Institute of Transport, Rome) compares the method used by him since 1910 in determining the fungicidal efficiency of wood preservatives with the wood block method with Kolle flasks recommended for general adoption at the international conference (at which Italy did not participate) in Berlin in 1930 [*R.A.M.*, x, p. 356].

Compliance with two conditions is essential: firstly, the results obtained must be based on the percentage concentration of the preserving fluid (determined by exact weight measurement) in the wood, not before injection, and secondly, the fluid must be distributed in the blocks as uniformly as possible. The 2 cm. thickness of the blocks generally used does not permit a uniform distribution of the fluid, the concentration of which in the block in relation to the weight of the latter is very different from that of the solution before injection. Sawdust might obviate this difficulty, but only if every particle contained an identical percentage of fluid; the necessary addition of water, however, disturbs the experimental conditions, while a further drawback is that the growth conditions of a fungus on sawdust being different from those on wood blocks the results may disagree.

Originally, the author advised the use of wood 1 mm. thick, but more recently he has used longitudinal pieces of veneer not more than 0·7 mm. thick placed in Roux tubes ('Breazzano's thin piece method'), an inoculation being considered to have given a positive result when the mycelium appears on the surface opposite that on which it was sown. Owing to the thinness of the test pieces the distribution of the fluid in them is as uniform as possible, and the results obtained are based on the concentration of the fluid in the wood. The fungus is placed on the treated wood, not the latter on a well-developed culture growing on agar in a Kolle flask, a method which the author considers to be inexact and the results of which he regards as unconvincing. In previous papers fully describing his method [see *Riv. Tecn. Ferrovie Ital.*, iv, 5, 1913, and *Rendic. nona Riun. Assoc. Ital. Studi sui Mater. da Costruz. tenuta in Torino* 19–22 *aprile 1922*] he stressed the necessity for taking precautions when removing a piece of mycelium from the culture not to bring away a fragment of the medium with it, otherwise a fungus which is supposed to be growing on a wood block may be deriving nutriment from its original medium. The numerous checks usually considered necessary to confirm the growth of a fungus on a wood block 2 cm. thick themselves indicate the unreliability of the method.

In other respects the author's technique closely agrees with that advocated in Berlin.

IMAI (Y.). **Studies on the transmission of Broad Bean mosaic.**—*Trans. Sapporo Nat. Hist. Soc.*, xiii, 3, pp. 241–245, 1934.

Broad bean [*Vicia faba*] mosaic was experimentally shown to be transmissible to broad beans by *Aphis rumicis*, *Macrosiphum pisi*, and *Myzus persicae* [*R.A.M.*, ix, p. 121 *et passim*]. The first-named insect conveyed infection from broad beans to garden and sweet peas, the second to sweet peas, and the third to garden peas. Infective aphids were able to transmit the disease to healthy broad beans after one day's feeding on a mosaic plant. The incubation period of the virus in the plant generally ranged from six to ten days, rarely up to three or four weeks. The progeny of viruliferous aphids, produced by parthenogenesis, failed to transmit mosaic.

In contradistinction to Böning [ibid., vii, p. 134], the writer obtained successful transmission of broad bean mosaic by needle inoculations with infected juice.

PERSONS (T. D.). **Preliminary report on an anthracnose of Lima Bean.**—Abs. in *Phytopath.*, xxiv, 7, p. 837, 1934.

Lima beans [*Phaseolus lunatus*] at Lyman, Mississippi, were attacked in 1932 by a fungus which seems to be a *Colletotrichum* and which causes reddish-brown, irregular lesions of variable extent on the pods. Numerous pink spore masses, surrounded by dark setae, were found in the diseased areas. The organism agrees well both with *Vermicularia polytricha* Cooke (*Grevillea*, xii, p. 24, 1883) and *C. caulicolum* Heald & Wolf (*Mycologia*, iii, p. 10, 1911), the spore measurements of which are given as 30 by 4 and 18 to 30 by 3·5 to 4 μ, respectively, while those of the Mississippi species are 21·6 to 28·8 by 3·6 μ. In nearly all cases the spores were more or less falcate. A description of a pod blight of Lima beans in North Carolina and Virginia by W. D. Moore (*Plant Disease Reporter*, xv, p. 113, [1931]) also agrees closely with the disease under observation.

WELLMAN (F. L.). **Identification of Celery virus 1, the cause of southern Celery mosaic.**—*Phytopath.*, xxiv, 7, pp. 695–725, 6 figs., 1934.

An extensive account is given of a new virus with a wide host range which causes a true mosaic of celery and is destructive also to cultivated cucurbits and sweet pepper (*Capsicum annuum*) in Florida and other parts of the United States [*R.A.M.*, xiii, p. 416]. It is transmissible by *Aphis gossypii* and artificial juice inoculations, filterable through a bacteria-excluding Berkefeld 'W' filter, destroyed by ten minutes' heating at 75° C. but not by 14 days' freezing, withstands dilution with water at ratios up to 1 in 100,000, and resists ageing *in vitro* for two days at 28° and for six to eight at 20°. The infective principle further resists desiccation on cloth for three to five days, being destroyed, however, within a day in crumbling infected cucumber foliage. It succumbs in fifteen minutes to 1 per cent. nitric acid, 50 per cent. hydrated lime solution, or 10 per cent. sodium chloride solution, but not to 50 per cent. ethyl alcohol. This virus, which the author names celery virus 1, was found to spread with considerably greater rapidity

within Turkish tobacco, *Nicotiana glutinosa*, and White Spine cucumbers than those of cucumber and tobacco mosaic and tobacco ring spot.

Although the symptoms of southern celery mosaic (the name applied by the writer to the disease induced by celery virus 1) show certain similarities to those of other well-known mosaics, there is considered to be no doubt that the virus concerned is new and distinct. The disturbances produced on celery by inoculation with the new virus were found not to correspond with those described on the same host by Poole [ibid., i, p. 440], Harvey (*Minnesota Agric. Exper. Stat. Bull.* 222, 1925), and Elmer [*R.A.M.*, iv, p. 755], which are believed to have been due to cucumber virus 1 [see next abstract].

Preliminary host range studies have shown that celery virus 1 is capable of infecting 23 species and varieties of plants in 8 families, including (besides those already mentioned) *Commelina nudiflora*, beet, broad bean (*Vicia faba*), cowpea, *Phacelia whitlavia* [cf. ibid., xiii, p. 601], tomato, *Datura stramonium*, *Physalis* spp., *Zinnia elegans*, *Tagetes patula*, and *Emilia sagittata*.

PRICE (W. C.). **Isolation and study of some yellow strains of Cucumber mosaic.**—*Phytopath.*, xxiv, 7, pp. 743–761, 6 figs., 1934.

On the basis of symptoms produced by inoculation experiments on Davis Perfect cucumbers, Bonny Best tomatoes, Henderson's Long Season spinach, Turkish tobacco, *Nicotiana glutinosa*, and *N. langsdorffii*, five strains of yellow viruses were differentiated as occurring in the bright yellow spots frequently observed in tobacco plants infected by R. H. Porter's cucumber mosaic virus ('white pickle mosaic virus' or 'cucumber virus 1'), a virus producing an ordinary green mosaic in cucumbers [*R.A.M.*, xi, p. 349; xii, p. 673]. Strain 1 is the least virulent, producing symptoms resembling those of Porter's virus on the differential hosts. The symptoms caused by strains 2 and 3 are similar to those of Porter's cucumber mosaic but the spotting is much more vivid. These two strains may be differentiated by their behaviour on *N. langsdorffii* and tomato, the symptoms of 3 being somewhat less severe than those of 2. Strain 4 is an attenuated form of 2 and 3, whereas 5 produces strikingly different symptoms consisting of systemic necrotic primary lesions in tomato, *N. glutinosa*, *N. langsdorffii*, tobacco, and spinach, and both yellow and necrotic primary lesions in cucumber. The lesions usually assume the form of solid spots or zonate rings but may occasionally follow the veins and produce oak-leaf patterns. This strain does not appear to be stable, giving rise to yellow mosaic in the systemically diseased leaves of several of the hosts studied. Some experiments were also carried out with E. M. Johnson's cucumber mosaic type 1 [ibid., x, p. 60], which produces symptoms on cucumber similar to those caused by Porter's virus 1 but can be differentiated from the latter by its effects on the other hosts mentioned above. By inoculation from tobacco leaves with yellow symptoms caused by infection with strain 5, a yellow and a green mosaic were separated in pure form, the evidence being that they arose in the plants infected with this strain. The former (strain 6) produces the most vivid spotting of any of the viruses here described, causing yellow primary lesions in all the above-mentioned hosts, of which tobacco, *N. glutinosa*, and spinach

occasionally develop complete chlorosis. It was experimentally ascertained that there is little difference between Porter's and Johnson's cucumber mosaic viruses and the newly described ones as regards their thermal death points and capacity to withstand ageing *in vitro*.

When Porter's cucumber mosaic virus 1 was passed in 10 serial transfers through the necrotic primary lesions that it produces in Black Eye cowpeas, in which there is little or no systemic spread, and subsequently inoculated into tobacco, it continued to produce in the latter bright yellow spots in addition to the usual green mottling. Similarly when Johnson's type 1 virus was passed through cowpeas it was still able to cause yellow spots on tobacco. When a mixture of a green (Porter's virus 1) and a yellow (strain 2) cucumber virus was used to infect cowpeas, most showed on transfer to tobacco only the presence of either the green or the yellow virus, though one cowpea plant spot had a mixture of both. This supports the conclusion that the yellow spotting caused on tobacco by green viruses after extended passage through local lesions on cowpea originated in some way (possibly by mutation) in the tobacco. In one case Johnson's virus after remaining as a green virus in cowpeas for 8 transfers produced some yellow spots on the 9th in addition to the necrotic local lesions, and subsequent transfers from the yellow spots continued to produce these and caused some systemic invasion and they also caused yellow mosaic on tobacco. In this case the yellow mutation appears to have arisen in the cowpea.

KENDRICK (J. B.). **Cucurbit mosaic transmitted by Muskmelon seed.**—*Phytopath.*, xxiv, 7, pp. 820–823, 1 fig., 1934.

In controlled experiments at Davis, California, with 23 packets of 12 commercial varieties of muskmelon, successful seed transmission of cucurbit mosaic [see preceding abstract] was obtained in 27 out of 11,519 plants (0·23 per cent.). The disease was subsequently transferred by artificial means from the mosaic Honey Dew seedlings to the Casaba, Hale's Best, Honey Ball, Honey Dew, and Tip Top muskmelon varieties and to the Early White Bush Scallop, Giant Summer Crookneck, and Italian squashes. In each case 100 per cent. infection was secured, the typical symptoms of the disease appearing in ten to twelve days.

YU (T. F.). **Pythium damping off of cucumber.**—*Agric. Sinica*, i, 3, pp. 91–106, 5 figs., 1934.

Pythium aphanidermatum [*R.A.M.*, xiii, p. 599] was observed in March, 1933 to be causing a severe damping-off of cucumbers in the hotbeds of the Nanking University garden [ibid., x, p. 776], some 80 per cent. of the plants being killed. The disease was subsequently found to be very prevalent in the neighbourhood.

The fungus was readily isolated on various standard media. The morphological characters, most conveniently studied in water cultures, are fully described [ibid., xiii, p. 399]. The zoospores, of which there are 8 to 50 in each vesicle, are reniform, biciliate, and measure 14 to 17 by 5 to 6 μ when in motion, 7·6 to 10·2 μ after coming to rest. The terminal, spherical, smooth oogonia measure 13 to 31·7 μ in diameter (average 23·8 μ), and the spherical, smooth oospores 13·6 to 24·2 μ

(18·7 μ). The lobate, intercalary antheridia measure 10·4 to 15·3 by 10·4 to 11·9 μ and generally occur singly, rarely two to an oogonium.

Positive results were given by inoculation experiments with *P. aphanidermatum* on *Benincasa hispida* [*B. cerifera*], melon, watermelon, *Cucurbita moschata*, cucumber, *Luffa cylindrica*, *Momordica balsamina*, *Lagenaria leucantha* [*L. vulgaris* Ser.], eggplant, chilli, and tomato [ibid., xiii, p. 124], causing fruit rot (and damping-off of cucumber); on cabbage (head rot); and on *Brassica chinensis*, radish, and tobacco (damping-off).

Good control of the disease was effected by the application to the soil of 1·5 or 2 per cent. acetic acid at the rate of 2 qt. per sq. ft. 9 to 13 days before sowing the seed.

Smith (C. O.). **Stem-spot of Rhubarb.**—*Phytopath.*, xxiv, 7, pp. 832–833, 1 fig., 1934.

A preliminary note is given on a rhubarb disease that has become increasingly prevalent in California since 1914. It is characterized by oval to elliptical, reddish to reddish-brown spots, 1 to 15 by 1 to 3 mm., sometimes coalescent, on the stems, leaf blades, veins, and petioles, mostly of the first cuttings. From the petiole lesions a species of *Phyllosticta*, tentatively determined as *P. straminella* Bres. (cf. F. L. Stevens in *Illinois Agric. Exper. Stat. Bull.* 213, p. 299, 1919), was repeatedly isolated and inoculated into wounded and unwounded petioles with positive results.

Crawford (R. F.). **The etiology and control of Chile wilt, produced by Fusarium annuum.**—*New Mexico Agric. Exper. Stat. Tech. Bull.* 223, 20 pp., 3 figs., 3 graphs, 1934.

The *Fusarium annuum* wilt of chilli peppers [*Capsicum annuum*] is stated to be the most serious disease of the crop in New Mexico [*R.A.M.*, xiii, p. 420]. Its first symptom is a more or less sudden wilt of the lower leaves, with a tendency to curl towards the midrib, the condition gradually spreading to the upper leaves. Death of the affected leaves and eventually of the whole plant may take place in a short time, depending on temperature, moisture, and methods of cultivation. Early outbreaks of the disease usually lead to the complete loss of the crop. Most commonly infection occurs at the base of the stem, wounds not being necessary for the entry of the fungus. Dark brown cankers are formed which gradually girdle the plant. The roots are also attacked, becoming soft and water-soaked. The wilting and death of the diseased plants is not caused by a mechanical plugging of the xylem but by the breaking down and disintegration of the invaded tissues. Experiments showed that the wilt is not seed-borne, and that *F. annuum* can live in the soil indefinitely; it is spread in the fields with loose soil during sand storms, and also by irrigation water. The species concerned belongs to the *Martiella* section, and possesses usually continuous microconidia, chiefly three-septate macroconidia (although five-septate ones are not uncommon), and mostly non-septate chlamydospores borne singly, in chains, or in clusters.

In pure culture the fungus grows most rapidly at temperatures from 23° to 31°, with an optimum at about 27° C.; its growth appeared to be

retarded by any considerable fluctuations in temperature. Field observations indicated that the wilt is most serious in low, wet fields, or where the crop is grown on heavy, undrained soils. The paper terminates with a brief account of field tests to determine the effect of different cultural practices on the incidence and severity of the wilt, a full report of which has been noticed from another source [loc. cit.].

TERUI (M.). **On the occurrence of the wilt disease of Sesame in Japan.**—*Trans. Sapporo Nat. Hist. Soc.*, xiii, 3, pp. 225–226, 1934.

In 1932 sesame plants at the Hokkaido Imperial University, Sapporo, were attacked by a wilt disease, characterized by wrinkling, drooping, and blackish-brown discoloration of the leaves (the last-named symptom also affecting the stems and roots), and by the eventual death of the plants. The causal organism was readily isolated on a number of standard media, making the best growth at about 30° C., and was inoculated into sesame plants with positive results. It produced branched conidiophores bearing a head of mostly non-septate, ovoid to ellipsoid, hyaline microconidia, 5 to 23·5 by 2·5 to 5·5 μ, and also formed lunulate, cinnamon buff-coloured macroconidia, 3-, 4-, or 5-septate, measuring 20·8 to 44·2 by 2·6 to 4·5 μ, 36·4 to 49·4 by 3 to 5 μ, and 41·6 to 52 by 4 to 5 μ, respectively. Apical or intercalary chlamydospores were produced. These characters are considered to agree with those of *Fusarium vasinfectum*, with which the fungus is accordingly identified [*R.A.M.*, v, p. 767; vi, p. 123].

PETRI (L.). **Sull'arricciamento (court-noué) della Vite.** [On leaf roll (court-noué) of the Vine.]—*Boll. R. Staz. Pat. Veg.*, N.S., xiv, 2, pp. 273–278, 1934. [English summary.]

After referring to his earlier papers on vine court-noué, in which he expressed the opinion in 1929 [*R.A.M.*, ix, p. 83] that the condition belongs to the virus group of diseases and pointed out that the best diagnostic symptom is the presence of intracellular cordons in the wood [cf. ibid., xii, p. 419], the author states that in the latest edition of Sorauer's Handbook of Plant Diseases [ibid., xiii, p. 646] the disease is included in the virus group, but no reference is made to his papers on the subject, the view that it is due to a virus being wrongly assigned to the French phytopathologists. Its attribution by Viala and Marsais to the fungus *Pumilus medullae* [ibid., xiii, p. 680] may be due to a confusion between this disease and the numerous forms of 'rachitism' to which the vine is subject, while Ranghiano's endophytic mycelium [ibid., xiii, p. 616] is not considered to have been conclusively demonstrated.

A bibliography of 12 titles is appended.

DE CASTELLA (F.). **Court-noué—a mysterious Vine disease.**—*Journ. Dept. Agric., Victoria*, xxxii, 6, pp. 298–301, 1934.

In discussing the various theories that have been put forward as to the real nature of court-noué of the vine and in drawing attention, in particular, to the recent paper by Viala and Marsais attributing the majority of cases to the fungus *Pumilus medullae* [see preceding

abstract], the author states that the disease is not uncommon in some parts of Australia, where, however, recovery is more frequent than in Europe.

BENTLEY (S.). **Powdery mildew of the Vine.**—*Gard. Chron.*, xcv, 2477, pp. 409–410, 1 fig., 1934.

In connexion with a recent official publication (*Min. of Agric. Advisory Leaflet* 207) concerning the occurrence of powdery mildew of the vine [*Uncinula necator*] in England [see next abstract], the writer describes the results of experiments in the control of this disease on the St. Emilion, Frontignan, and Cepages Rouges varieties in Charente Inférieure, France, in 1932–3 [cf. *R.A.M.*, xiii, p. 745]. In the former season the outcome of preliminary trials with shirlan HB and a small quantity of agral I for wetting and spreading [ibid., xii, p. 403; xiii, p. 10] were so satisfactory that tests on a larger scale were conducted in the following year with shirlan AG (in which agral is incorporated) at the rates of 6, 10, and 13 oz. per 10 galls. water. The disease was effectively combated at all the concentrations used in the case of mild attacks, but where infection was more severe it was necessary to employ the preparation at maximum strength. Shirlan tends to collect in a white deposit at the base of the fruits, the rest of which is covered with a thin film, quite harmless to the grapes and comparing favourably with the heavy coating left by Bordeaux mixture. Early application is very important.

DURHAM (H. E.). **Powdery mildew of Vines under glass.**—*Gard. Chron.*, xcvi, 2480, p. 13, 1934.

The writer's attempts to control powdery mildew [*Uncinula necator*] on three 60-year-old glasshouse vines in England by three applications of shirlan AG [see preceding abstract] were quite unsuccessful. Both in fungicidal and adhesive properties the preparation was found to compare unfavourably with 1 per cent. lysol [*R.A.M.*, xi, p. 493]. The results on apple foliage attacked by mildew (*Sphaerotheca*) [?*Podosphaera leucotricha*] and on tomato leaves infected by *Cladosporium* [*fulvum*] were equally poor, but a considerable improvement was effected in the condition of vegetable marrows suffering from a white mildew [?*Erysiphe cichoracearum*]. Hitherto the best control of *U. necator* on the vines has been given by the tasteless, non-poisonous drug chinosol [quinosol: ibid., xiii, p. 792] which is scarcely practicable, however, for use on a commercial scale.

OLTARJEVSKI (N. P.). Исследование инкубационных периодов мильдью Винограда в условиях континентального климата и их значение в профилактике. [Study of the incubation periods of the Vine mildew under continental climatic conditions, and their significance in prophylaxis.]—*Acta Inst. Bot. Acad. Scient. U.R.P.S.S.*, Ser. iv (*Bot. Experimentalis*), Leningrad, *1934*, 1, pp. 223–234, 4 figs., 2 graphs, 1934. [German summary.]

Field observations in 1930 in the Caspian area and the Caucasus, where the climate is of an essentially continental type, with night temperature minima frequently fluctuating between 6° and 0·5° C. as

late as the end of June while the diurnal (24 hours) mean temperature varies between 18° and 20° or even higher (temperature records being taken at 7 a.m., 1 p.m., and 9 p.m.), showed that spring outbreaks of vine mildew (*Plasmopara viticola*) only occur after periods of three or four days during which the night minimum does not sink below 13° to 10°, all other meteorological conditions being in favour of the development of the disease [cf. *R.A.M.*, xiii, p. 561]. In certain localities strong winds during the night and early morning were also found to be a limiting factor in the development of the outbreaks, presumably in consequence of their desiccating action on the moisture present on the leaves [ibid., xiii, p. 678]. These observations, supported by the results of a small range of controlled experiments [details of which are given], are considered to support the author's view [ibid., xi, p. 93] that Müller's incubation curve [ibid., x, p. 432] is not applicable under all sets of climatic conditions, and should be corrected to suit the local conditions prevalent in different regions.

Further observations in 1930 indicated that sprinkling the vineyards with 1 per cent. Bordeaux mixture 1 to 1½ months prior to the outbreak of the primary infection (from the winter spores) did not check the development of the disease. Owing to shortage of copper sulphate in Russia, experiments were made to find an effective substitute for it in the control of the mildew, including barium, calcium, and sodium polysulphides; barium polysulphide was slightly effective when applied at the time of highest susceptibility of the fungus to treatment, but the other two polysulphides not only did not give control but appeared to stimulate the fungus; all three preparations scorched the vine foliage rather severely, and significantly reduced the sugar content and increased the acidity of the resulting crop, as compared to that from vines sprayed with Bordeaux mixture. A small range of tests indicated that 1 per cent. soap emulsion gave a measure of control of *P. viticola*, the chief drawback of this preparation being the ease with which it is washed off by rain and dew; the addition of inert substances to the emulsion only slightly increased its adhesivity, and had the disadvantage of seriously clogging the nozzles of the spraying guns.

Young (V. H.). **Observations on the control of black rot of Grapes.**—Abs. in *Phytopath.*, xxiv, 7, pp. 841–842, 1934.

Black rot (*Guignardia bidwellii*), the most serious disease of Concord grapes in north-west Arkansas, may be adequately controlled by the application, just before and directly after blooming and 10 to 14 days later, of 4–4–50 Bordeaux mixture [cf. *R.A.M.*, x, p. 75]. No additional benefit was derived in five years' experiments by extra pre- and post-blossom sprays.

In May 1930 numerous black rot cankers were found at the base of suckers arising at or below soil level subsequent to extensive killing back of the vines by severe midwinter frosts. The cankers were covered with pycnidia containing mature spores, which had evidently developed from conidia or ascospores washed on to the young sprouts from the previous year's mummies lying on the ground. The diseased tissues were rapidly isolated by a corky layer and had almost disappeared by mid-season.

Hengl (F.) & Arthold (M.). **Die Stielfäule der Trauben und ihre Bekämpfung. Ergebnisse der im Jahre 1932 durchgeführten Versuche.** [The stalk rot of Grapes and its control. Results of the experiments conducted in the year 1932.]—*Die Landwirtsch.*, Vienna, pp. 187–188, 1933. [Abs. in *Bot. Centralbl.*, N.F., xxv, 1–2, pp. 54–55, 1934.]

The best control of stalk rot of grapes [*Botrytis cinerea*: *R.A.M.*, xi, p. 495] in a Lower Austrian vineyard was obtained in 1932 by two applications in July of Bordeaux mixture and cotton-seed oil soap [cf. ibid., xi, p. 253; xiii, p. 779], the latter being used at the rate of 200 gm. per 100 l. of the mixture.

Gigante (R.). **Fenditure di origine non parassitaria nei tralci della Vite.** [Cracks of non-parasitic origin in Vine branches.]—*Boll. R. Staz. Pat. Veg.*, N.S., xiv, 2, pp. 211–222, 8 figs., 1934. [English summary.]

Green vine branches examined by the author showed dark longitudinal cracks ranging in length from a few millimetres to the length of the internode and occasionally including the node. The tissues were split along the medullary rays, the sides of the crack being composed of a layer of deformed cells with lacerated walls, overlying a few layers of necrosed cells; the latter were separated from the healthy parenchyma by a cork layer. In the deeper cracks the walls were composed of a superficial layer of necrosed cells, with callus originating in the cambium and medullary rays underneath. Where the medulla itself was cracked the walls of the crack became covered with callus and were quickly cut off from the unaffected part by a cork layer, while owing to tensions and contractions set up in the growing branch two secondary cracks occurred perpendicularly to the main one along a line separating the medulla from the central cylinder. The new tissues contained no lignified elements. The xylem of the primary vascular bundles situated laterally to the medullary ray along which the crack extended was discoloured and the space between the bundles filled with a parenchymatous tissue.

No parasitic organism was present and the cracks are attributed to the exceptional turgidity of the branches resulting from the absorption by the vines of abnormal amounts of water during very rainy, humid weather. The branch tissues not increasing in turgidity uniformly, abnormal tensions, aggravated by the different growing rates of the various tissues, were set up. This unequal tension produced laceration and rupture of the less resistant tissues of the medullary rays.

Van Poeteren (N.). **Verslag over de werkzaamheden van den Plantenziektenkundigen Dienst in het jaar 1933.** [Report on the activities of the Phytopathological Service in the year 1933.]—*Versl. en Meded. Plantenziektenkundigen Dienst te Wageningen*, 76, 117 pp., 3 pl., 1934.

Among the numerous interesting items in this report, prepared on the usual lines [*R.A.M.*, xiii, p. 10], the following may be mentioned. For the first time in the history of the Dutch phytopathological service reports were received of heavy damage to the maize crops from *Ustilago maydis* [*U. zeae*].

An uncommon disease of pears was caused by a species of *Coniothyrium*, producing brown spots on the foliage and fruit. Infection is believed to have been favoured by the cold, damp spring and dry, hot summer. The same host was attacked by the so-called Pacific coast canker due to *Neofabraea malicorticis*, not hitherto reported in Holland but fairly prevalent in North America [ibid., xii, p. 299]. *Diplosporium album*, previously known only as a saprophyte, was isolated from St. Remy pears suffering from an extensive die-back of the branches, which may have been primarily due either to adverse environmental conditions or to the parasitic activity of the fungus.

Strawberries were affected by root rot and dwarfing of the aerial organs caused by a species of *Coniothyrium*, probably *C. fuckelii* [*Leptosphaeria coniothyrium*: ibid., xi, p. 767; xiii, pp. 637, 703], of which this is the first record on the strawberry in Holland.

Raspberry canes showed a yellowish-grey discoloration of the wood underlying the buds due to *Pyrenochaeta briardi* Hariot, the black pycnidia of which were visible to the naked eye on the affected areas. The fungus is stated to occur on *Rubus* sp. in the south of France, but this is the first record of its development on raspberry canes in Holland.

Urocystis colchici [ibid., iv, p. 210] was found infecting bulbs of *Colchicum bornmülleri*; other hosts of this smut are *C. autumnale* and *C. orientale*. *Crocus* (*C. zonatus*, *C. purpurea grandiflora*, and Enchantress) bulbs were submitted for the first time bearing lesions exactly corresponding with those caused on *Gladiolus* corms by *Septoria gladioli* [ibid., xiii, p. 581], and isolations yielded a fungus resembling *Septoria* in mycelial characters though no fructifications developed. The 'ink-spot disease' of *Iris reticulata* due to *Mystrosporium adustum* [ibid., x, p. 462] was also recorded for the first time in the country. Leeuwenbek *Antirrhinum* plants from Hilversum showed a leaf infection apparently caused by *Puccinia antirrhini* [ibid., xiii, p. 771], this being another new record for Holland.

The pycnidial stage (*Fusicoccum noxium*) of *Dothidea* (*Plowrightia*) *noxia* [ibid., viii, p. 347] was found to be responsible for an apical die-back of young beech twigs at Amersfoort.

In 1931 *Ophiobolus graminis* was found to be the cause of 'brown patch' on grass plots. During 1933 complaints of a similar condition were received from various quarters, e.g., Hilversum, where *Sclerospora graminicola* [ibid., xiii, p. 436], rarely or never before observed in Holland, was shown to be responsible for the injury. None of the common agents of the disorder was found among the grass samples from golf greens examined in 1933, with the exception of isolated *Rhizoctonia* hyphae [cf. ibid., xii, p. 781], but the roots contained spores of *Asterocystis radicis* and *Ligniera* sp. The former organism appeared to be as innocuous to the grasses as it has been shown to be to flax, of which it was long suspected to cause the 'fire' disease [ibid., vii, p. 578]. *L.* sp. is commonly encountered in the roots of beets affected by yellowing [ibid., xiii, p. 611], but its pathogenicity has not been demonstrated and for the present it must also be regarded as harmless to the grasses. A species of *Alternaria*, characterized by a greyish mycelium, was isolated from the decaying stems and may possibly be implicated in the causation of the trouble.

Notes are given on the potato blight [*Phytophthora infestans*] spray-warning service [ibid., xi, p. 123], the determination of the dates of initial infection by the apple and pear scab fungi [*Venturia inaequalis* and *V. pirina*], and the testing of various fungicides.

STELL (F.). **Report of Mycologist, 1933.**—*Admin. Rept. Dept. Agric. Trinidad and Tobago for the year 1933*, pp. 43–45, 1934.

During the period under review cacao witches' broom (*Marasmius perniciosus*) [*R.A.M.*, xiii, pp. 288, 359] continued to spread in Trinidad, a few very slight, sporadic centres of infection occurring in the Northern Range. As in other countries, infection is heaviest in low-lying districts where humidity and rainfall are highest. On the Government Cacao Estate in the Manzanilla area, where the disease is fairly severe, effective control has resulted from a monthly destruction of infected material, this method having reduced the losses of mature pods to under 1 per cent. [ibid., xiii, p. 289]. In an endeavour to select highly resistant or immune trees, monthly checks of the incidence of infection are being made on a very large number of observation plots in different localities, including those where the disease was first recorded in the island.

Messrs. Trinidad Leaseholds have put on the market a gas oil which is being successfully used to kill banana plants infected with Panama disease (*Fusarium* [*oxysporum*] *cubense*) [ibid., xiii, p. 112]. Two to four pints per stool are required, according to size; the plant and suckers are cut down to a few inches above soil level and the trash and weeds carefully removed to enable the oil to reach the underground parts and soil. The oil is then applied to the stool and the surrounding soil in such a way that the greater part reaches the soil immediately touching the outside of the plant and suckers, penetrating to the underground buds and killing the eyes. The aerial parts of the diseased stools are cut up and either burnt or sprinkled with oil.

Pennisetum purpureum, which is grown in many parts of Trinidad as fodder, was so severely infected by a *Helminthosporium* on one estate that practically nothing remained to cut; small outbreaks occurred in other localities, infection being most prevalent during the early months of the year, when temperatures are lowest.

WALLACE (G. B.). **Report on a survey of plant diseases in the Iringa Province in June, 1934.**—*Tanganyika Dept. of Agric. Mycol. Leaflet* 16, 15 pp., 1934.

Notes are given on a number of familiar diseases of economic crops encountered during a phytopathological inspection of the Iringa Province, Tanganyika Territory in June 1934, and also on an apparently new disease of coffee, tea, *Eucalyptus* spp., *Grevillea robusta*, tree tomato [*Cyphomandra betacea*], loquat, castor [*Ricinus communis*], *Cassia floribunda*, *Cinnamomum camphora*, rose, and other plants caused by a species of (?) *Stilbum*. Coffee leaves attacked by the fungus develop roughly spherical, putty-coloured, water-soaked, more or less conspicuously zonate lesions, covering up to half the surface, on which are formed dark, erect synnemata about 3 mm. long. The coffee cherries [fruits] bear similar spots of a greyish-green colour. The disease is accompanied by heavy defoliation and cherry fall in coffee and by

moderately severe loss of older leaves in tea, on which and on the other hosts of the fungus the symptoms are similar to the foregoing. The *Stilbum* disease is rife during the cold wet period from April to June or later; in all probability the causal organism originates in the jungle, where it can persist throughout the year. Infection is also favoured by heavy shelter, and control measures should be based on the amelioration of environmental conditions supplemented by the application in March of 2 per cent. Bordeaux mixture plus alum at the rate of 6 oz. per 16 galls.

LEACH (R.). **Report of the Mycologist for 1933.**—*Ann. Rept. Dept. of Agric., Nyasaland, 1933*, pp. 54–55, 1934.

Tea in Nyasaland is on the whole free from disease, the only fungus likely to prove extensively troublesome being *Armillaria* [*mellea*: *R.A.M.*, xiii, p. 216], which continues to cause damage on some estates. The rhizomorphs of this fungus were found growing plentifully from the dead roots of *Cajanus indicus* plants killed by it in a patch of badly affected tea in Mlanje and less profusely on dead tea plants in Cholo. The available evidence indicates that the spread of the disease in Nyasaland is primarily associated with the presence of the fungus in the dead roots of cleared forest trees; the removal of diseased roots would not give effective control if isolated, unattached rhizomorphs were capable of continuing infection of the replanted tea. Among the indigenous forest trees that are most likely to pass the disease on to tea is undoubtedly *Parinarium mobola* [ibid., xiii, p. 425].

A fruit spot and stem canker of mangoes, at first considered to be of fungal or bacterial origin but later attributed to insect attack, is being investigated.

AUCHINLECK (G.). **Report on the Department of Agriculture, Gold Coast, for the year 1933–34.**—18 pp., 1934.

After referring to the fact that since 1st October 1933 consignments of cacao beans for the United States must not contain over 5 per cent. mould or 10 per cent. combined mould and worm infection [*R.A.M.*, xi, p. 416], the author states that of the 1932–3 Gold Coast cacao crop 54,300 tons or just over one-fifth was below this standard, as was also the case in previous years [ibid., xii, p. 149].

Coco-yam [*Xanthosoma sagittifolium* and *Colocasia antiquorum*] root rot [ibid., xi, p. 763] was ascertained to be due to *Rhizoctonia* [*Corticium*] *solani* attacking roots growing in unfavourable soil.

Bananas were occasionally attacked by *Marasmius* disease [*M. stenophyllus*: ibid., xi, p. 97], causing collapse of the pseudostem.

MARCHIONATTO (J. B.). **Notas de patologia vegetal. Contribución al conocimiento de las enfermedades de las plantas provocadas por los hongos.** [Notes on plant pathology. A contribution to the knowledge of the plant diseases induced by fungi.]—*Rev. Fac. Agron. Univ. Nac. La Plata*, xix, 3, pp. 407–426, 12 figs., 1933. [Received October, 1934.]

Notes are given on some fungous diseases of cultivated plants observed

for the first time during the last few years in the Argentine Republic. They include *Colletotrichum gloeosporioides*, long present in orange and lemon plantations, but first detected in 1929 on kumquat (*Fortunella margarita*) in Corrientes and Tucumán; *Gloeosporium nervisequum* on plane (*Platanus occidentalis*) trees in the environs of Buenos Aires and La Plata [*R.A.M.*, xii, p. 735]; *Fusarium moniliforme* var. *subglutinans* [ibid., xiii, p. 510] producing a reddening of the caryopses of San Martin wheat; *Rhynchosporium secalis* causing scald of barley [ibid., xii, p. 676]; *Heterosporium avenae* [ibid., iv, p. 536] on oats; *Botrytis paeoniae* [ibid., ix, p. 785] on peonies (*Paeonia albiflora*), causing much damage in nurseries near Buenos Aires; *Rhizoctonia* [*Corticium*] *solani* on sugar beets; and *Mycosphaerella pinodes* and *Ascochyta pisi* [ibid., xiii, p. 612] on peas, the former producing perithecia on the leaves and stalks.

Poplars (*Populus balsamifera*) at Córdoba in 1928 bore spherical, yellow, purple-bordered cankers, 5 to 20 mm. in diameter, on the branches, strewn with the sub-epidermal, dark-coloured, coriaceous, globose pycnidia of *Dothiorella gregaria* [ibid., vii, p. 621], which arise singly or in groups from a basal stroma. The hyaline, fusoid straight or slightly curved pycnospores, truncated at both ends, measure 30 by 5 μ. Sporadic infection of *P. nigra* var. *italica* by *Septoria populi* [ibid., xi, p. 329] has been observed in the Paraná Delta islands.

The pale, scutiform lesions observed on peach branches in the Buenos Aires province and the Paraná Delta islands in 1930 are attributed to *Phoma persicae* [ibid., xi, p. 268] on the basis of the spore measurements and their allantoid shape. Associated with the abnormally cold, wet weather of the same year was a widespread die-back of peach trees caused by a species of *Cytospora* with stromatic pycnidia, 100 to 105 μ in diameter, and rod-shaped, curved, hyaline pycnospores (3 to 4 by 1 μ), tapering at both ends (probably *C. candida* Speg.), the ascigerous stage of which (*Valsa leucostoma*) [*Leucostoma persoonii*: ibid., xi, p. 60] was detected on the same host in 1927.

Vermicularia [*Colletotrichum*] *capsici* [ibid., xi, p. 545] was isolated in 1931 from chilli fruits collected at San Isidro, Buenos Aires, affected by a die-back first observed at Guatraché, La Pampa, in 1926. *Gloeosporium piperatum* (the imperfect stage of *Glomerella cingulata*) [ibid., xi, p. 803] is a common local agent of chilli fruit rot, but no genetic connexion could be traced between it and *C. capsici*.

Diaporthe citri [ibid., xiii, p. 763] developed readily in culture from the mycelium of *Phomopsis citri*, isolated from oranges in Corrientes (1928) and E. Ríos (mandarins) and in 1931 from the same host in Montevideo (Uruguay). Mandarins in E. Ríos were attacked in 1929 by a highly destructive stem-end rot associated with *Alternaria* and *Cladosporium* spp.

A species of *Coniothyrium* characterized by depressed-globose, carbonaceous pycnidia, 160 to 170 μ in diameter, containing continuous, dark-coloured, ellipsoidal pycnospores (3 by 2 μ), has been found on roses causing symptoms resembling those induced by *Coniothyrium fuckelii* (*Leptosphaeria coniothyrium*) [see above, p. 12], in other countries.

CLARA (F. M.). **A comparative study of the green-fluorescent bacterial plant pathogens.**—*Cornell Agric. Exper. Stat. Memoir* 159, 36 pp., 5 pl., 1934.

After mentioning that the number of species hitherto described in the green-fluorescent group of phytopathogenic bacteria is forty, the writer gives a comprehensive account of his studies of 19 species and 2 varieties (27 isolations) belonging to this group. They were *Phytomonas angulata* [*Bacterium angulatum*] from Virginia tobacco, *P. apii* [*Bacterium jaggeri* (Stapp) Elliott] from celery, *P.* [*Pseudomonas*] *cerasi* from sweet cherry [*R.A.M.*, xiii, p. 642], *Phytomonas* [*Pseudomonas*] *endiviae* from endive [ibid., ix, p. 503], *Phytomonas* [*Bact.*] *holci* from maize [ibid., xii, p. 165], *P.* [*Bact.*] *lacrymans* from cucumber [ibid., xiii, p. 419], *P. marginalis* [*Bact. marginale*] from lettuce [ibid., xii, p. 677], *P.* [*Bact.*] *medicaginis* var. *phaseolicola* from bean (*Phaseolus vulgaris*) and kudzu vine (*Pueraria hirsuta*) [ibid., x, p. 5], *Phytomonas polycolor* from Philippine tobacco [ibid., x, p. 133], *P.* [*Pseudomonas*] *syringae* from lilac [ibid., xiii, p. 288], *Phytomonas* [*Bact.*] *trifoliorum* from clover (*Trifolium repens*) [ibid., viii, p. 176], *P.* [*Pseudomonas*] *utiformica* from pear [ibid., xii, p. 376], *Phytomonas* [*Bact.*] *vignae* from Lima bean (*Phaseolus lunatus*) [ibid., xii, p. 2], *Phytomonas* [*Bact.*] *vignae* var. *leguminophila* from bean, *P. viridiflava* [*Bact. viridiflavum*] from bean [ibid., xii, p. 71], *P. viridilivida* [*Bact. viridilividum*] from lettuce [ibid., vi, p. 263; ix, p. 224], *Pseudomonas aeruginosa* (*Bacillus pyocyaneus*) [ibid., iv, pp. 184, 252, 368, 470], *P.* [*B.*] *fluorescens* [ibid., xii, p. 448], and *P. putrida* [*B. f. putridus*] from decaying storksbill [*Erodium cicutarium*] leaves.

The green-fluorescent character of this group of pathogens was consistently reproduced in Uschinsky's solution and Sullivan's basal asparagin solution (*Journ. Med. Res.*, xiv, p. 109, 1905). Seventeen plants were used in the cross-inoculation experiments, as a result of which the organisms may be placed in two groups according to their narrow or wide range of hosts [shown in tabular form]. The former group includes *Bact. medicaginis* var. *phaseolicola*, *Bact. jaggeri*, *Bact. lacrymans*, *Bact. angulatum*, *Bact. marginale*, *Bact. viridilividum*, and *Phytomonas polycolor*, all of which appear to be pathogenically distinct, while the latter comprises *Pseudomonas syringae*, *Bact. vignae* and its var. *leguminophila*, *Bact. viridiflavum*, *P. cerasi*, *Bact. trifoliorum*, *Bact. holci*, and *P. endiviae*, among which close biological relationship and possibly in some cases even identity is indicated. Many of the pathogens under observation are stated to be reported for the first time on the plants used in the tests. Of interest in this connexion is the capacity of *Bact. viridiflavum* and *P. endiviae* to infect *Delphinium*. Most of the definitely phytopathogenic organisms were characterized by their ability to ferment sucrose, a property that was lacking in the weak pathogens or in the bacteria innocuous to plants. It is proposed that *Bact. vignae* and its var. *leguminophila* should be considered as synonyms of *Bact. syringae*, while the definition of *P. cerasi* should be extended to include *Bact. trifoliorum* and *Bact. holci*. *B. fluorescens* may be regarded, by reason of its physiological characters and mild pathogenicity to Kieffer pears, as a transitional form between the plant pathogens and the non-phytopathogenic organisms of the green-fluorescent group.

Christoff (A.). Приносъ къмъ терапията на бактериалния ракъ при растенията. [Contribution to the therapeutics of crown gall.]—*Journ. Agric. Exper. Stations in Bulgaria*, Sofia, vi, 1–2, pp. 17–30, 2 figs., 1934. [English summary.]

Details are given of experiments, the results of which showed that primary and secondary tumours, artificially induced by inoculations of *Bacterium tumefaciens* into tomato and sunflower stems, were successfully destroyed, without undue injury to the hosts, by local application of radiated heat (52° to 55° C.) for 5 to 10 minutes, by plunging one electrode from a low tension dry battery into the tumour and touching the surface of the tumour with the other electrode, and finally, by introducing into the tumour tissues the vapour of osmic acid from crystals contained in a small glass ampulla terminating in a capillary tube, the end of which is plunged into the tumour and left in it until the appearance of the first faint symptoms of degeneration of the tumour. In a small range of experiments, the tumours were also killed by introducing into them one or two drops of a 2 per cent. solution of osmic acid, the treatment not interfering with the general health of the hosts.

Park (M.). **Further notes on Cacao disease in the Dumbara Valley, 1933.** —*Trop. Agriculturist*, lxxxiii, 2, pp. 78–86, 1 graph, 1934.

A non-parasitic wilt of cacao locally termed 'sudden death', the symptoms of which closely resembled 'plethora' disease in St. Thomas Island, Gulf of Guinea [*R.A.M.*, xiii, p. 220], was common in the Dumbara Valley, Ceylon, in 1933. It is considered to have resulted from marked fluctuations in rainfall, though aluminium poisoning due to soil deficiency in exchangeable lime may have been a contributory factor. Suggestions are made for combating the disease by the provision of adequate shade and manuring.

Israilsky (V.) & Kazakova (Mme A.). Бактериозы Пшеницы. (Предварительное сообщение.) [Bacterioses of Wheat. (Preliminary communication.)]—*ex* Биохимия и микробиология Пшеницы [Biochemistry and microbiology of Wheat], *Pan-Soviet Scient. Inst. of Cereal Res.*, Moscow, *Publ.* 13, pp. 38–40, 1934.

Isolations in 1932 from samples of wheat affected with black chaff [presumably from the Ukraine: cf. *R.A.M.*, xi, p. 285] yielded practically pure cultures of a bacterium which in artificial culture produced colonies very similar to those of *Bacterium translucens*. In its biochemical properties, however, it was found (as shown in a comparative table) to be intermediate between this organism and *Bact. atrofaciens* [ibid., xii, p. 431], and may possibly be a variant of the former. Tests were started at Kharkoff [Ukraine] in 1932 to determine whether the disease is transmitted through soil or carried by naturally or artificially infected seed-grain.

Grooshevoy (S. E.) & Maklakova (Mme G. F.). Ржавчина зерновых культур и меры борьбы с ней. [Rusts of cultivated cereals and their control.]—30 pp., 14 figs., Госуд. Издат. Колхоз. и Совхоз. Литературы [State Publishing Office of Collective and Soviet Farming Literature], Moscow, 1934.

In the introductory section to this paper the authors state that now

that the campaign for controlling the cereal smuts [*Tilletia*, *Ustilago*, and *Urocystis* spp.] is approaching completion in the U.S.S.R., cereal rusts [a brief morphological and biological account of which is given] have become one of the outstanding and urgent problems of Russian agriculture, owing to the huge losses caused by them almost every year. For instance, the shortage attributable to them in 1932 is estimated at a value of 322·5 million roubles [nominally £32,250,000]. Stem [black] rust of wheat [*Puccinia graminis*] is especially destructive in the Russian Far East and the south-eastern districts of North Caucasus, where it contributes to a large extent to the gradual reduction from year to year in the wheat acreage. In the remaining areas of Russia and Siberia its occurrence on wheat is for the most part sporadic and restricted, but it attacks rye and oats much more severely. Crown rust [*P. lolii*] of oats very frequently destroys over 50 per cent. of the crop in the chief oat-producing regions of the Union (Ukraine, Central Chernozem provinces, and White Russia), where the total losses caused by it in 1932 are stated to have amounted to over 1,000,000 tons of grain. It also did considerable damage in 1933. Among the leaf rusts, the brown [*P. triticina*] and yellow [*P. glumarum*] rusts of wheat very often reduce the yield by 50 per cent. and over in North Caucasus and the south-west of the Ukraine, while in the rest of the Union the losses average about 20 per cent. in years of heavy infection, and some 10 per cent. in other years.

In discussing control methods, experimental dusting with sulphur from aeroplanes is stated to have given satisfactory results in some areas, where the treatment reduced the injury from the rusts by 40 to 50 per cent. In other regions, however, the results were disappointing, and hardly warranted the expenditure of time and sulphur dust; were the dusting to be methodically performed over the whole territory of the Union growing cereals it would require many hundred thousand tons of sulphur annually, and moreover, as it was shown that one aeroplane can only treat effectively an area not exceeding 1,000 hectares, would necessitate the creation of fleets of thousands of aeroplanes surpassing any practical possibility. The treatment can be financially sound only in regions where the rusts are particularly severe, and in years of heavy epidemics.

Control by the use of resistant varieties is not practicable in the U.S.S.R., owing chiefly to the present paucity of known resistant varieties, and to the fact that varieties resistant to one rust are highly susceptible to others and to various serious diseases such as the *Fusarium* rots, besides lacking agronomic qualities. The only variety which so far deserves to be widely tried is the No. 053 variety of oat, produced by the Verkhnyatcheskaya Plant Protection Station, which is very resistant to crown rust. The only promising means of control are improved cultural measures and the suppression of the alternate hosts of the rusts, especially barberries and buckthorns [*Rhamnus* spp.], the eradication of which is discussed in some detail. Sufficient and well-balanced fertilization promotes the rapid and vigorous development of the cereal plants, and renders them more resistant to rust. In many cases the severity of infection was markedly reduced by applications of phosphatic and potassic fertilizers, with or without the addition of

nitrogenous substances; excess of nitrogen should, however, be avoided, as it tends to render the plants less resistant.

Sowing of winter varieties of cereals should be done at the optimum period, dependent on the local ecological conditions, in the autumn. Too late sowing is deprecated for the reason that it prolongs the date of maturation of the plants, which are thus subjected to a longer period of infection with air-borne uredospores from the earlier crops. For the same reason it is strongly recommended that autumn sowing should be done rapidly (within 10 days) in a given area, delimited by the prevailing climatic conditions, and only varieties homogeneous in their date of maturation and in their resistance to the rusts should be employed. As instancing the bearing of the date of autumn sowing on the development of brown leaf rust of wheat, a reference is made to experiments made in 1928 and 1929 at the Mironovka Experimental Station [Ukraine] (where the optimum period of sowing is normally from the 9th to 14th of September), the results of which showed that towards the end of October all the wheats sown in August were severely infected with rust from nearby stubble and volunteer wheat, while in the plots sown at the normal time only a few scattered uredosori could be found after prolonged search. Later in the autumn, however, the normal plots became very heavily infected from the neighbouring early ones and from volunteer plants within the crop. The rust overwintered as mycelium in the plants, with the result that in the following spring it broke out severely at the time of ear-formation and flowering, i.e., from 15 to 20 days earlier than in normal sowings. The experiments also showed that with 100 per cent. infection at this stage of growth, the yield was reduced by over 50 per cent., while when the rust attack developed with the same intensity 15 to 20 days later, i.e., at the milky stage, the yield was reduced only by 24 or 25 per cent.

As a further preventive measure, it is recommended that winter wheats should not be grown intermixed with, or in close proximity to spring varieties, as they are an unfailing source of infection for the latter. Spring sowing should be done as early as possible. Old stubble and volunteer plants should be carefully destroyed by fire or deep ploughing, followed by clean fallow, when in close proximity to cereal fields.

Zekl (F.). **Ursachen des Weizen-Rostes.** [Causes of Wheat rust.]—*Deutsche Landw. Presse*, lxi, 32, p. 397, 1934.

The Austrian wheat harvests in four out of the twelve years analysed by the writer are stated to have been appreciably damaged by rusts [*Puccinia graminis*, *P. glumarum*, and *P. triticina*: *R.A.M.*, xiii, p. 752]. The mean grain yield during the 12-year period averaged 2,193 kg. per hect., whereas taking the four bad years only the average was 1,717 kg. against 2,428 kg. for the remaining eight years, a reduction (considered to be due to rust) of 711 kg. per hect. The wheat uniformly followed clover or lucerne, an inadvisable sequence from the standpoint of rust infection but favoured by farmers on account of the stimulus to growth afforded by the nitrogenous effect of these leguminous crops. The seasons of heavy rust infection were characterized by low precipita-

tion, great heat, much sunshine, and high atmospheric humidity in July [ibid., xii, p. 359]. In one of the eight non-epidemic years, however, most of these conditions were present, but this happened to be the only year with such conditions in which the usual spring top-dressing with nitrate was omitted owing to the excellent growth of the crop in the spring.

VIENNOT-BOURGIN (G.). **Contribution à l'étude des Urédinales en Seine-et-Oise (7e Note). De l'activité de Puccinia glumarum (Erikss. & Henn.) en période hivernale dans la département de Seine-et-Oise (région sud).** [Contribution to the study of the Uredinales of Seine-et-Oise (7th Note). On the activity of *Puccinia glumarum* (Erikss. & Henn.) in winter in the Department of Seine-et-Oise (south region).]—*Bull. Soc. des Sciences de Seine-et-Oise*, Sér. III, ii, 3–4, pp. 21–36, 1934.

Six years' field and laboratory investigations conducted at Grignon into the overwintering of *Puccinia glumarum* showed that a number of distinct biologic forms are present locally. During autumn uredospores from volunteer wheat and barley plants are able to infect the seedlings of the normal autumn sowings. If unfavourable weather prevails the mycelium lives on within the latter, resuming uredospore production with the return of better conditions. The author considers that his evidence does not support the view that 'plant refuges', e.g., secondary (grass) hosts on which the cereal parasite is able to develop in the uredo stage during autumn and winter so as to be able to reinfect the crop in the spring, play an important part in the cereal rust problem in the area concerned.

BECKER (K. E.). **Die amtlich empfohlenen Beizmittel nach dem Stande vom 4. August 1934. Das Wichtigste zur Herbstbeizung.** [The status of the officially recommended disinfectants on 4th August, 1934. The essential in autumn disinfection.]—*Deutsche Landw. Presse*, lxi, 34, pp. 421–422, 1934.

A table is given showing the appropriate concentrations and duration of treatment for the various fungicides officially recommended by the German Plant Protection Service against the four principal seed-borne diseases of cereals, viz., wheat bunt [*Tilletia caries* and *T. foetens*], snow mould of rye [*Calonectria graminicola*], stripe disease of barley [*Helminthosporium gramineum*], and loose smut of oats [*Ustilago avenae*: *R.A.M.*, xii, p. 84]. Some general directions for the choice and application of the different treatments are also given. Effective against all the diseases in question, where immersion is practised, are ceresan U. 564, fusariol 157, germisan, and uspulun-universal [see next abstract]; all but the last-named may also be used in the sprinkling method (except against *U. avenae*, amenable to control by sprinkling only with formaldehyde). In the short disinfection process ceresan and germisan give effective control of all the diseases. Abavit-universal (not to be confused with abavit B) [ibid., x, p. 94; xii, p. 152; xiii, p. 2, *et passim*] and ceresan are the most suitable general dusts for the purpose under discussion.

Lindfors (T.). **Försök med utsädesbetning utförda 1931–32.** [Experiments in seed disinfection carried out in 1931–32.]—*Statens Växtskyddsanst. Medd.* 5, 23 pp., 1934. [German summary.]

A comprehensive account, supplemented by 13 tables, is given of the laboratory and field experiments in the disinfection of cereal seed-grain against various fungous diseases and of sugar-beet against *Phoma betae* carried out in Sweden during 1931–2 [*R.A.M.*, x, p. 510]. Good control of snow mould of rye [*Calonectria graminicola*] was given by uspulun dust (U.T. 687), tutan, betoxin, and B88, applied at the rates of 1·5, 1·5, 2, and 3 gm. per kg., respectively. The most promising results in the elimination of stripe smut of rye [*Urocystis occulta*] were obtained with uspulun in the first year's tests and with tutan and 0·1 per cent. mercuric chloride (20 minutes' immersion) in the second series of trials.

Absolute control of wheat bunt [*Tilletia caries* and *T. foetens*] was secured by sprinkling the seed-grain with a 2 per cent. solution of U. 520 (30 c.c. per kg.), while virtual freedom from infection was also conferred by uspulun dust (2 gm. per kg.) and fusariol dust 844 (3 gm. per kg.). Moderately satisfactory results were further obtained with 2 per cent. germisan (moistening at the rate of 30 c.c. per kg.), tutan (2 gm. per kg.), fusariol dust 1416, B 110, and B 111 (all at 3 gm. per kg.).

Stripe disease of barley [*Helminthosporium gramineum*] was effectively combated by 30 minutes' immersion in 0·2 per cent. germisan or 0·25 per cent. uspulun-universal, sprinkling with 2·5 per cent. germisan or U. 520 (30 c.c. per kg.), and dusting with uspulun (3 gm. per kg.).

Only two preparations gave adequate control of loose smut of oats [*Ustilago avenae*], namely, 0·25 per cent. germisan solution (30 minutes' immersion) and havretillantin dust (3 gm. per kg.); these treatments, and also tutan (4 gm. per kg.), augmented the yield by an average of 4 per cent. Considerably more effective in the latter respect was uspulun dust (3 gm. per kg.), which doubled the yield. Like tutan, however, it failed to eliminate smut completely and should thus be used only on slightly infected seed-grain.

Uspulun dust (6 gm. per kg.) was the only one of four disinfectants to give an encouraging result in the control of *P. betae* on sugar beets on clay soil with an alkaline reaction near Linköping.

Schouten (A.). **Lohnbeizeinrichtungen in Holland.** [The hire system of seed disinfection in Holland.]—*Nachricht. über Schädlingsbekämpf.*, ix, 3, pp. 136–141, 5 figs., 1934.

Of increasing importance and popularity in Holland is the hire system of seed-grain disinfection with ceresan dust, applied by mechanics travelling round the country with portable dusting machines affixed to bicycles or motor trucks and in some cases run off the engine of the latter. The writer predicts a considerable extension of utility for this practice. Many seedsmen now supply their customers exclusively with ceresan-treated seed-grain, while co-operative societies and similar associations also use this method of disinfection.

Mourashkinsky (K. [E.]). Подзимние посевы яровой Пшеницы и пыльная головня. [Late autumn sowing of spring Wheats in relationship to bunt.]—*На Защиту Урожая* [*Crop Protection*], *1934*, Moscow, 8, pp. 23–24, 1934.

This is a very brief account of experiments in 1933 in western Siberia, the results of which showed that late autumn sowing of spring wheats was not effective, as suggested by certain Russian authors, in reducing the incidence or severity of wheat bunt [*Tilletia caries* and *T. foetens*] in that region.

Lee (A. A.). **Ball smut in Wheat. Methods of control.**—*Journ. Dept. Agric. Victoria*, xxxii, 2, pp. 57–59 and 75, 3 figs., 1934.

The author states that experiments during a number of years at Longerenong, Rutherglen, and Werribee (Victoria) have shown that dusting wheat seed-grain with copper carbonate gave better control of wheat bunt [*Tilletia caries*: *R.A.M.*, xii, p. 275] than steeping the grain in either copper sulphate or formalin solutions. The tests at Rutherglen, in particular, showed that wheat raised from grain dusted with copper carbonate outyielded that produced from formalin-treated seed by 3 bushels per acre and that obtained from copper sulphate-treated seed by 4·4 bushels.

Vassilievsky (A.). Эффективный протравитель—тальк-арсин.—[Talc-arsin—an effective seed disinfectant.]—*На Защиту Урожая* [*Crop Protection*], *1934*, Moscow, 1, pp. 36–37, 1 graph, 1934.

This is a brief report of field tests in 1932 in the neighbourhood of Moscow of the efficacy in the control of wheat bunt [*Tilletia caries* and *T. foetens*] of talc-arsin dust, which is stated to contain only 2·3 per cent. of As_2O_3, as against 9·91 per cent. in Davydoff's preparation, which superseded in 1933 the copper carbonate dust AB [*R.A.M.*, xii, p. 617]. In one test it completely suppressed bunt in the ensuing crop, while Davydoff's preparation gave 1·8 per cent. infection, with 35·7 per cent. in the control plot; in another trial, the seed treated with talc-arsin gave 0·37 per cent. infection, seed treated with Paris green dust 0·67 per cent., that treated with Davydoff's preparation 1·65 per cent., with 67·3 per cent. bunt in the controls. Results in 1933 confirmed those of the preceding year, although complete control of bunt was not attained. The dose of all the three dusts per cwt. of seed-grain is the same.

Luthra (J. C.) & Sattar (A.). **Some experiments on the control of loose smut, Ustilago tritici (Pers.) Jens., of wheat.**—*Indian Journ. Agric. Sci.*, iv, 1, pp. 177–199, 2 diags., 1934.

Loose smut of wheat (*Ustilago tritici*) is common in the Punjab, where it is estimated to cause an average annual loss of at least 2 per cent. of the crop, representing a value of £400,000. The writers have evolved four methods of controlling this disease, of which one, the simplified hot water treatment, has been successfully used on a large scale on experiment stations for the last five years. The procedure is as follows.

The wheat (Punjab 8–A was chiefly used in the experimental work) is pre-soaked in unheated water at 60° to 85° F. for four to seven hours, dipped in water at 120° for five minutes, immersed in water at 127° to 132° for seven minutes, and thoroughly dried prior to immediate or subsequent sowing. This method is relatively simple but demands a certain amount of skill in the maintenance of the required temperatures, so that it can only be applied by educated farmers. On the other hand, the single-bath, sun-heated water, and solar energy methods are within the capacity even of the illiterate local peasantry. In the single-bath treatment the seed-grain is soaked for four, six, or eight hours in water at 105°, 110°, or 115°, respectively. For sun-heating, the seed-grain is exposed on a sunny day between June and August to heating by the sun from 12 noon to 4 p.m. in a blackened, cylindrical, galvanized iron vessel, 30 by 6 in., half-filled with water, and then dried. The solar energy method consists merely in the exposure to the sun from noon till 4 p.m. of moistened seed-grain previously soaked in water at normal temperature from 8 a.m. till noon. The last three methods are applicable in their present form, only to the hotter parts of the Punjab plains, while the first is adapted for use in the hills.

Mourashkinsky (F.). Новый метод борьбы с пыльной головней Пшеницы. [A new method for the control of loose smut of Wheat.] —*На Защиту Урожая* [*Crop Protection*], *1934*, Moscow, 1, pp. 30–31, 1934.

In this brief note the author states that experiments in 1933 in western Siberia confirmed the efficacy in the control of loose smut [*Ustilago tritici*] of wheat of the method recently devised by Gassner [*R.A.M.*, xii, p. 499; xiii, p. 750]. Locally, soft wheats (*lutescens*) were shown to be more resistant to the treatment than hard ones (*hordeiforme*), since the amount of smut which developed in the *lutescens* plants raised from treated seed was reduced to 12 per cent. by steeping the grain for eight hours in 5 per cent. ethyl alcohol solution at 40° C., as against 55·8 per cent. in the controls, while the smut was entirely absent from the *hordeiforme* crop raised from seed treated for three hours with the same dilution of alcohol at the same temperature.

Szembel (S. [I.]). Пшеница Закавказия под угрозой. [Threat to Wheat in Transcaucasia.]—*На Защиту Урожая* [*Crop Protection*], *1934*, Moscow, 8, pp. 22–23, 1934.

The author states that flag smut of wheat (*Urocystis tritici*) was first recorded causing an insignificant amount of infection in Azerbaijan [south-western littoral of the Caspian Sea] in 1930. It spread very rapidly, until in 1934 up to 20 per cent. of the wheat-fields in the Republic were found to be infected, and all the affected plants remained unproductive. A very short account of the disease is given, together with a brief discussion of control as practised abroad. Measures are being taken to determine the exact limits of the infected area, with a view to prevent further spread of the disease by strict quarantine regulations, and the notification of the discovery of even a single diseased plant in a field has been made compulsory.

MILLER (W. B.) & MILLIKAN (C. R.). **Investigations on flag smut of Wheat caused by Urocystis tritici Koern.**—*Journ. Dept. Agric. Victoria*, xxxii, 7, pp. 365–380; 8, pp. 418–432, 13 figs., 1 graph, 1 map, 1934.

A comprehensive, tabulated account is given of investigations, started in 1927, of flag smut of wheat (*Urocystis tritici*) in Victoria, where much loss is caused owing to the widespread use of susceptible varieties and inadequate control measures. Preliminary tests showed that heavy contamination of the seed with spores is necessary to give accurate data on the relative susceptibility of wheat varieties. Where low infection occurred, many varieties exhibited an apparent resistance out of proportion to their true inherent resistance.

A number of varieties proved to be resistant or moderately resistant [cf. *R.A.M.*, xii, p. 18; xiii, p. 568], and their use was shown in the field experiments in seven centres to provide a valuable means for the control of the disease in affected areas. Of these Ghurka wheat is especially valuable, since it has proved to be a prolific variety in many districts. In susceptible varieties the number of totally infected plants usually exceeds that of partially infected ones, the reverse being generally true in resistant varieties. Attempts to obtain resistant strains by selection from susceptible varieties have been so far unsuccessful.

Spore germination in *U. tritici* and subsequent infection of the seedlings is favoured by the absence of excessive moisture in the soil, and by soil temperatures above 50° F. The development of the disease is promoted by conditions which tend to prolong the susceptible seedling stage of the host. In manurial tests at Rutherglen and Walpeup superphosphate generally reduced infection, but the effect of lime and sulphate of ammonia varied. Severe infections were obtained in soils with a P_H range of 5·5 to 8·7. The results of analyses indicated that the development of the fungus in the host tissues is apparently influenced by a general increase in the percentages (on a dry weight basis) of nitrogen, ash, lime, potash, and phosphoric acid during the early stages of growth, but no relation could be established between the resulting infection and any single constituent.

The results of replicated trials with inoculated and clean seed-grain, to determine the effect of flag smut on yield, indicated that in general the ratio of reduction in yield to percentage of smut was greatest in resistant varieties, the increased reduction (as compared with that in susceptible varieties) being apparently due to 'suppressed' (not outwardly visible) infection; this was particularly noticeable in the Ghurka variety, and was not evident in Nabawa [ibid., xii, p. 18]. Experiments to test the effect on the smut of cultural practices showed that deep sowing tended to increase infection, and that the losses resulting from flag smut were slightly increased by cutting back the infected plants. Seed treatment with copper-containing powders did not give complete control in the case of heavy infection of the seed-grain, but was effective under ordinary working conditions [cf. next abstract]. The paper terminates with a number of recommendations for the control of the disease and a bibliography of 74 titles.

Dawson (G. T.). **Seed-borne flag smut infection. Effectively controlled by copper carbonate treatment.**—*Agric. Gaz. New South Wales*, xlv, 8, pp. 431–432, 2 figs., 1934.

In tests conducted over a period of six years in New South Wales in which wheat seed heavily inoculated with flag smut [*Urocystis tritici*: see preceding abstract] was dusted with copper carbonate (2 oz. per bushel) or dipped for three minutes in a 1½ per cent. solution of copper sulphate and then in lime-water, the dusted seed gave an average yield of 27 bushels 40 lb. an acre, with 4·33 per cent. infection, the corresponding figures for the wet treatment being 23 bushels 49 lb., and 7·3 per cent., and for the untreated control seed 24 bushels 50 lb., and 21·6 per cent. The copper sulphate and lime treatment impaired the vitality of the seed, and is not recommended.

Graf-Marin (A.). **Studies on powdery mildew of cereals.**—*Cornell Agric. Exper. Stat. Memoir* 157, 48 pp., 1 fig., 8 graphs, 1934.

In the course of investigations [which are fully described and the resulting data tabulated] on various physiological aspects of barley mildew (*Erysiphe graminis*) [*R.A.M.*, xiii, p. 626 and next abstract] at Cornell University, New York, it was found that a higher percentage of germination was obtained from conidia on dry slides in moist air than those in drops of water. The maximum stimulus to germination and germ-tube development was afforded by a nutrient solution of 2·5 per cent. cane sugar. Ascospores were formed in twenty-two hours from asci in perithecia placed in water for twelve hours and then transferred to an incubator at 21° C. The successive inoculation of Alpha barley plants at different ages showed that the tendency to perithecial production increased with advancing age, and that this was correlated with a decline in susceptibility to mildew. It was ascertained that the germ-tubes of *E. graminis* are incapable of penetrating the coarse cuticle of old leaves, which ranges in thickness from 2·5 to 5 μ compared with 0·4 to 1·5 μ in the younger ones. On the removal of the cuticle abundant mildew infection was obtained, indicating that the normal immunity of fully developed leaves from invasion by the fungus is of a purely mechanical order. Affected leaves transpired 67 per cent. more water per unit of leaf surface than healthy ones, mainly due to increased opening of the stomata. Diseased plants had 47 per cent. more dry matter (as a percentage of fresh weight) than healthy, had fewer leaves, with 18 per cent. reduction in individual leaf area and 44 per cent. reduction in the fresh weight of the tops.

Germar (B.). **Über einige Wirkungen der Kieselsäure in Getreidepflanzen insbesondere auf deren Resistenz gegenüber Mehltau.** [On some effects of silicic acid on cereal plants, especially on their resistance to mildew.]—*Zeitschr. für Pflanzenernährung, Düngung und Bodenkunde*, A, xxxv, 1–2, pp. 102–115, 1934.

It was shown by experiments [the results of which are discussed and tabulated] at Jena University that the resistance of Petkus winter rye, Pflugs summer barley, and Hohenswetterbach Bearded and Heines

Kolben summer wheat to mildew (*Erysiphe graminis*) [*R.A.M.*, xi, p. 157; xiii, p. 431; and preceding abstract] was appreciably augmented by the application to the plants (in pots of quartz sand) of silicon dioxide at the rate of 5, 15, or 30 gm. per pot. The cause of the enhanced resistance evidently lies in the silicification of the cell membranes of the leaf whereby the ingress of the haustoria is impeded or prevented.

The treatment was not effective against certain fungi entering the leaves through the stomata.

ROSELLA (E.). **Les piétins des céréales.** [Cereal foot rots.]—*Prog. Agric. et Vitic.*, cii, 26, pp. 13–17, 1934.

After a brief, popular description of the foot rot of cereals caused by *Cercosporella herpotrichoides* and the root rot due to *Ophiobolus graminis* [*R.A.M.*, xiii, p. 568], the second of which occurs fairly frequently in the region of Paris and is particularly serious in the south of France and in French North Africa (Algeria and Morocco), the author briefly discusses the measures for their control. Among these late autumn sowing, cultivation in ridged rows, and well-balanced manuring are effective against *C. herpotrichoides*, while a sufficiently long crop rotation is considered to be the best means to check *O. graminis*. A warning is again given [ibid., xii, p. 560] against the indiscriminate use of sulphuric acid for the control of *C. herpotrichoides*, in view of the injury it may cause to the cereals, especially when applications are followed by frost.

SPRAGUE (R.). **Preliminary note on another foot rot of Wheat and Oats in Oregon.**—*Phytopath.*, xxiv, 8, pp. 946–948, 1 fig., 1934.

Winter wheat and oats on red sandstone-shale soils with an acid reaction in certain coastal areas of Oregon have been attacked during the past four seasons by a foot rot with symptoms closely resembling those due to *Gibellina cerealis*, reported from northern Italy and Hungary [*R.A.M.*, x, p. 447]. Elongated, pale, dark-edged lesions develop on the lower leaf sheaths and basal nodes of the culms. In early May a dirty white mycelial mat is formed over the lesions on the outer sheaths and between the underlying ones. Gradually a velvety, white stroma is produced, containing small, yellow to brown, abortive fruit bodies. In a few cases immature perithecia, agreeing with those of *G. cerealis*, have been found, but no ripe fructifications have developed, possibly on account of the dry summer climate.

On potato-dextrose agar the fungus produced a rapidly growing, loose to floccose, dirty white mycelium, from which were formed pale yellow, turning orange, then brown sclerotia of a firm, rubbery consistency, hemispherical, up to 6 mm. in diameter, and sometimes aggregating into fair-sized masses. These cultures were found to be identical with two new isolations of *G. cerealis* from Italy. The Oregon form grows best at 18° to 24° C., the minimum and maximum temperatures for development being 6° and 27° to 30°, respectively. The fungus caused a destructive blight of wheat, oats, and barley seedlings in inoculation tests. In the field, barley and most wheats will not grow on acid soil infested by *G. cerealis*, to which oats are less susceptible.

HIRSCHHORN (J.). **Dos royas de la Cebada, nuevas para la Argentina.** [Two Barley rusts new to the Argentine.]—*Rev. Fac. Agron. Univ. Nac. La Plata*, xix, 3, pp. 390–397, 2 figs., 1933. [Received October, 1934.]

Attention has already been drawn in a preliminary note to the detection in 1930, for the first time in the Argentine, of two rusts on barley, *Puccinia anomala* and *P. glumarum* [*R.A.M.*, xiii, p. 296]. After describing the life-history and symptoms of the former it is stated that judging by the character of the infection on different species (*Hordeum spontaneum* and *H. deficiens*) and varieties (Oderbrucker, Manchuria, Minn. 184, Manchuria × Smooth-awned, and Coast), the biotype of *P. anomala* occurring in the Argentine is distinct from those found in Australia and the United States [ibid., ix, p. 438; x, p. 230; xiii, p. 760].

P. glumarum has been found to occur in a much more virulent form on *H. spontaneum* and its var. *nigrum*, *H. tetrastichum*, and *H. hexastichum* than on *H. distichum*. In 1931 *H. pusillum* Nutt. var. *euclaston* Steud. [*H. euclaston* Steud.] was attacked by yellow rust—apparently an exceptional case.

POULSEN (A.). **Warmwasserbehandlung von Gerste.** [Hot water treatment of Barley.]—*Nachricht. über Schädlingsbekämpf.*, ix, 3, pp. 141–145, 1 fig., 1934.

Very encouraging results have been obtained in Denmark against stripe disease and loose smut of barley [*Helminthosporium gramineum* and *Ustilago nuda*] by the addition to the heated steeping water (51° to 52° C.) of 0·5 or 1 per cent. tillantin (the name under which ceresan liquid U. 564 [see above, p. 20] is marketed in Denmark). Both diseases were adequately controlled without the impairment of germination apt to accompany the hot water treatment alone.

STELZNER (G.). **Experimentelle Untersuchungen über den die Gerstenstreifenkrankheit hervorrufenden Pilz Helminthosporium gramineum Rbh. unter besonderer Berücksichtigung seiner Infektionsverhältnisse.** [Experimental investigations on the fungus causing Barley stripe disease, *Helminthosporium gramineum* Rbh., with special reference to its mode of infection.]—*Bot. Arch.*, xxxvi, 3, pp. 301–344, 9 figs., 1934. [English summary.]

A comprehensive, tabulated account is given of the author's investigations at Leipzig on the stripe disease of barley caused by *Helminthosporium gramineum* [*R.A.M.*, x, p. 231 *et passim*], with special reference to the mode of infection by the fungus.

The penetrating hyphae are first found in the radicles of the seedlings, especially in the region of the collar. Through the root node they pass into the hypocotyl and subsequently infect the entire plant. Hyphae entering by way of the coleoptiles cause noticeable infection of the basal leaf, but unlike those entering by the root, they do not involve the whole plant. The vegetation cone is permeated by the mycelium reaching the hypocotyl from the root node, and all the newly developing plant organs contract infection from the invaded axis. The fungus penetrates the vascular bundles of the leaves, rapidly extending the entire length within the tracheids and tracheae and producing by this parallel course

the familiar striped effect. The vessels are disorganized and the vital activities of the adjoining parts interrupted. The hyphae ultimately spread chiefly in a transverse direction, invading and destroying the enfeebled leaf parenchyma. In places a thick fungal cell plate, rich in protoplasm, is formed as a basis and food reservoir for the developing conidiophores. Under the influence of strong pressure, e.g., by wind, the foliar stripes rupture and present the well-known split aspect. In the haulm the fungus occurs principally in the zone of intercalary growth, whence the pith cavity is later attained. Occasional foci of infection may also be encountered in the vascular bundles of the haulm, but in general the rapid lignification of this region is adverse to the spread of *H. gramineum*. From the tracheids and tracheae of the ear the mycelium grows into the individual flowers, causing no appreciable damage if maturity is well advanced; it has even been obtained in pure culture from the pollen grains.

The latent occurrence of the stripe fungus has been observed in summer barley [ibid., xii, p. 109], causing general weakening of the plants and decay of the roots with consequent severe winter injury. Early sowing (between 8th March and 7th April 1933) was found to favour infection of the Isaria variety, whereas no apparent influence on the course of the disease was exercised by nutritional factors. A high degree of susceptibility to stripe was shown by Ackermanns Isaria and Bavaria and Heines Hanna, while Criewener 403, Nolč, and v. Dregers Bohemia and Allerfrüheste gave evidence of resistance to infection. The disease occurred in a moderately to very severe form on the progeny of Franken and Hanna barley used in the tests. *Hordeum spontaneum* and *H. zeocriton* contracted severe infection under natural conditions.

Practically complete control of *H. gramineum* was given by the following treatments: one hour's immersion in solutions of 0·25 per cent. uspulun-universal or 0·125 per cent. germisan, 30 minutes in 0·25 per cent. germisan, germisan short disinfection process (3 l. of a 2·5 per cent. solution per 100 kg. of seed-grain), and ceresan dust (3 gm. per kg.) [ibid., xiii, p. 627, and above, pp. 20, 21].

Stripe disease causes a material reduction of the whole substance of the plant as well as of its non-nitrogenous extractives; on the other hand, constituents originating in the soil, like nitrogen and ash, show a considerable increase. Infected plants are characterized by enhanced relative transpiration.

Conidiophores bearing conidia develop rapidly on infected barley leaves in a moist chamber at 20° C. The length of the conidial cells is a fixed specific character showing only insignificant variations. Conidial germination was found to be most profuse on neutral soil extract, on which fresh conidia extruded germ-tubes in four hours. Conidial germination is not affected by temperature fluctuations between 4° and 20°. Sclerotia are produced by *H. gramineum* in pure cultures on plum agar at P_H 5·8. The temperature limits of mycelial growth lie at 3° to 4° and 32°. The reaction of the substratum is shifted towards the alkaline side by the development of the mycelium; the latter process is retarded by strong sunlight. In pure culture the mycelium retains its viability for at least a year and in the barley plant for considerably longer.

GARBER (R. J.) & HOOVER (M. M.). **Dehulled seed, glume color, and reaction to smut in a certain Oat cross.**—*Journ. Amer. Soc. Agron.*, xxvi, 8, pp. 673–680, 1934.

In continuation of previous experiments [*R.A.M.*, ix, p. 298], the writers have secured additional data on the factors governing reaction to loose and covered smuts (*Ustilago avenae* and *U. levis* [*U. kolleri*]) in the oat varieties Black Mesdag and Gopher and certain descendant lines from hybrids between them.

The reaction both of the parents and of the progeny to each of the two smuts was similar. A material increase of infection and mortality followed dehulling the seed prior to treatment. Eighty F_2 descendant families from the back-cross 17–10–75–5–1 × F_1 and reciprocal, and 53 similar families from the Gopher × F_1 back-cross and reciprocal were grown under smut epidemic conditions. The resultant data corroborated in general those obtained earlier in respect of glume colour and smut reaction inheritance. The back-crosses gave no significant evidence of a close linkage between the gene for black glumes and that responsible for increased susceptibility to smut, although in one such cross a slight predominance of highly susceptible families came from black (15) as compared with white (11) seed.

NIEVES (R.). **Nota preliminar sobre un probable hibrido natural (Avena byzantina × A. fatua) atacada por Ustilago levis.** [A preliminary note on a probable natural hybrid (*Avena byzantina* × *A. fatua*) attacked by *Ustilago levis*.]—*Bol. Mens. Min. Agric. Nac.*, Buenos Aires, xxxvi, 1, pp. 73–79, 1934.

Hybrid oats (probably resulting from natural crossing between *Avena byzantina* and *A. fatua*) near the Guatraché Experiment Station, Argentine, were observed in November 1933 to be attacked to the extent of 46 per cent. by a smut which in most cases resembled *Ustilago levis* [*U. kolleri*], but in some was more like *A. avenae* or was intermediate between the two [*R.A.M.*, xii, p. 622]. The evidence is so far insufficient to determine whether these types of the smut (which causes a 20·5 per cent. reduction in the height of the plants) are the result of natural hybridization between *U. kolleri* and *U. avenae* or merely of variation in the former.

MASCHHAUPT (J. G.). **Das Rätsel der Dörrfleckenkrankheit.** [The mystery of the grey speck disease.]—*Zeitschr. für Pflanzenernährung, Düngung und Bodenkunde*, B, xiii, 8, pp. 313–320, 1934.

As a result of extensive observations in the Groningen district of Holland on the grey speck disease of oats [*R.A.M.*, xi, p. 363; xii, p. 19], the writer makes the following recommendations for its control. An attempt may be made to improve by liming the condition of clay soils definitely ascertained to be poor in calcium, provided the humus content is reasonably low. Where the latter, however, exceeds 6 per cent., great care should be exercised in the application of lime, even where there is a marked calcium deficiency, and the reaction of the soil to liming should first be experimentally determined. On all soils where grey speck disease is a factor to be considered, nitrogen should be

given in the form of ammonium sulphate and never in that of Chile saltpetre. On the appearance in late May or early June of unmistakable symptoms of the disorder, 50 to 100 kg. of manganese sulphate per hect. should be applied as early as possible.

STAKMAN (E. C.), CASSELL (R. C.), & MOORE (M. B.). **The cytology of Urocystis occulta.**—*Phytopath.*, xxiv, 8, pp. 874–889, 3 pl., 1 fig., 1934.

This is an expanded account of the writers' studies on the cytology of *Urocystis occulta*, the agent of flag smut of rye, a summary of which has already appeared [*R.A.M.*, xiii, p. 435]. The sporidia of the fungus do not appear to become detached from the promycelium or to bud extensively, so that the opportunities for variation through hybridization would seem to be restricted. This supposition is borne out by the result of a limited number of tests on several rye varieties with different collections of the smut, in which no clear-cut evidence of divergences in pathogenicity was obtained.

GIOELLI (F.). **Fenomeni di antagonismo tra 'Penicillium digitatum' (Pers.) Sacc. e 'Penicillium italicum' Weber.** [Phenomena of antagonism between *Penicillium digitatum* (Pers.) Sacc. and *Penicillium italicum* Weber.]—*Ann. di Botanica*, xx, 2, pp. 327–346, 1933. [Received October, 1934.]

Investigations [which are fully described] showed that when *Penicillium digitatum* and *P. italicum* were inoculated into oranges and lemons their mutual antagonism [*R.A.M.*, xii, p. 168] became progressively more pronounced as the temperature was lowered; at moderately high temperatures growth was so rapid that the hyphae spread from one colony right up to the other, leaving a distinct line of demarcation but no neutral zone free from hyphae; later, the colonies merged into one another. On pieces of orange and lemon rind and in culture on artificial media *P. digitatum* and *P. italicum* were not mutually antagonistic. When the organisms were grown in media made with juices expressed from the pulp of oranges and lemons, the effect of the addition of fresh juice to the medium in which either fungus had been grown upon the subsequent growth of the other showed clearly that the medium had previously become depleted of its nutrient constituents. The older the cultures of one fungus, the more unsuitable they became for the growth of the other. The toxins liberated by both organisms were largely thermostable and were capable of ultrafiltration.

A bibliography of 64 titles is appended.

GRASOVSKY (A.) & SHIFF (M.). **The effect of ammonium bicarbonate on the storage of Oranges.**—*Hadar*, vii, pp. 168–172, 1934. [Abs. in *Hort. Abstracts*, Imper. Bureau of Fruit Production, iv, 3, p. 168, 1934.]

Good control of the green and blue moulds [*Penicillium digitatum* and *P. italicum*] and *Diplodia* rot [*D. natalensis*] on Palestinian stored oranges [*R.A.M.*, xii, p. 24] was obtained in experiments from 1931–3 by the use of ammonium bicarbonate [ibid., xi, p. 366], the best results being given by the insertion of the crystals within the wrapper. The

treatment was found, however, to increase the incidence of the physiological breakdown known as 'nooksan' [ibid., xii, p. 285] though the losses from this were more than counterbalanced by the elimination of the moulds.

ALTSON (R. A.). **Fruit-rot or bunch-rot of the Oil Palm.**—*Malayan Agric. Journ.*, xxii, 8, pp. 361–366, 2 pl., 1934.

An investigation of a rot of the fruit bunches of oil palms affecting not less than 40 per cent. of a crop covering 700 acres in Malaya showed that four main types of decay were present, base rot, stigma-end rot, bunch-end rot, and early bunch rot or bunch rot. In the first a brown water-soaked lesion appeared on the base of the fruit, and as it became larger the fruit became detached, but held in place by the bracts, often continuing to rot *in situ*. In the second, sunken areas appeared on the apex of the fruits, which became shrivelled and dry. In the third, the distal end of a bunch decayed and could easily be pulled out, leaving a basal portion which often remained unaffected. In the fourth, the whole bunch was involved and usually decayed during an early stage of development; this form of decay could often be confused with the decay of unpollinated bunches. The disease was constantly associated with a *Fusarium* belonging to the section *Martiella*, a *Bacillus* of the *B. mesentericus* group, a *Flavobacterium* resembling *F. diffusum*, and two species of *Achromobacter*, all of which are considered to be saprophytes attacking tissues weakened by some nutritional disturbance. A typical form of the rot was induced by artificial dislocation of the food supply. It is suggested that the predisposing nutritional disturbance was due to soil deficiency, the effects of which were aggravated or induced by artificial pollination.

PASCALET (M.). **Les maladies cryptogamiques du Caféier au Cameroun.** [The fungal diseases of Coffee in the Cameroons.]—*Ann. de Cryptog. Exot.*, **vii**, 1, pp. 21–31, 1934.

In this paper the author, who is the Director of the Nkongsamba Coffee Experiment Station, established in 1932 in the Cameroons, gives notes on the symptoms, damage caused by, and control of the following coffee diseases present in the Colony: brown root rot (*Phellinus lamaoensis*) [*Fomes noxius*: *R.A.M.*, xii, p. 286], white root rot (*Leptoporus* [*F.*] *lignosus*) [ibid., xii, p. 91], root and branch necrosis caused by *Polyporus coffeae* [ibid., xi, p. 699] and also by *Botryodiplodia theobromae*, *Rhizoctonia* attacking the collar and roots, pink disease (*Corticium salmonicolor*) [ibid., x, p. 788], trunk and branch cankers due to *Nectria coffeigena*, the ascogenous form of *Fusarium coffeicola* [ibid., i, pp. 4, 205], leaf and branch lesions caused by the alga *Cephaleuros virescens* [*C.* (?) *parasitica*: ibid., i, p. 92 *et passim*], *Hemileia vastatrix* [ibid., xii, p. 436], *Cercospora coffeicola*, *Sphaerella* [*Mycosphaerella*] *coffeicola* [ibid., x, p. 775], and sooty mould (*Morphea citri*).

P. coffeae is characterized by a whitish, later somewhat dark, rubbery mycelium harbouring the mealy bug *Pseudococcus citri* [ibid., vii, p. 702]; affected coffee may live on for several years, though death usually occurs during the second year after infection. A few months after the initial attack, which takes place by means of rhizomorphs, the collar

and the primary roots are invaded; only cordons are present at first, but these thicken and anastomose, completely encircling the root. After the death of the bush the completely rotted tissues may develop the fructifications, which recall those of *P. squamosus* Huds. [ibid., xii, p. 44]. The fungus was also found saprophytically on stumps of oil palms, whence it spread to weakened trees. It is most prevalent in very acid (P_H 5), badly drained soils.

The collar and roots of coffee bushes in several plantations showed the presence of a *Rhizoctonia* having a superficial, violaceous mycelium consisting of septate hyphae branched at right angles; underneath the decomposed bark black pustules were found, closely adhering to the ligneous parenchyma.

N. coffeigena, first reported by Hennings in 1893, appears to have come originally from the Cameroons. The mycelium penetrates the bark, which becomes necrosed, and then rapidly attacks the ligneous parenchyma; widespread cankers result, which in the case observed by the author were mainly confined to the top of the stem.

Two-year-old *Coffea robusta* in a European plantation is affected by a new top necrosis characterized by a withering from the terminal bud downwards. The affected bark shows several fungi, including one with pink conidia, the perithecia of a *Gibberella* measuring 125 to 175 μ in diameter, the conidia of a *Pestalozzia* and those of a *Colletotrichum*, probably *C. coffeanum*, and pycnidia 110 to 140 μ in diameter. The condition apparently results from bark infection by the pink conidial form, followed by the perithecial stage, *C. coffeanum*, and the *Pestalozzia*.

H. vastatrix was present sporadically in one area (Dschang), but energetic steps were taken to remove the foci of infection.

Serbinoff (V.). Не допустим потерь от заболевания гоммозом Хлопчатника.—[Let us check the losses to the Cotton crop caused by gummosis.]—*На Защиту Урожая* [*Crop Protection*], *1934*, Moscow, 1, pp. 23–26, 3 figs., 1934.

After a brief popular account of the damage done to cotton by gummosis (*Bacterium malvacearum*) [*R.A.M.*, xiii, p. 696], the author states that in the U.S.S.R. the disease is most prevalent and severe in Transcaucasia and Russian Central Asia, chiefly in the areas where Egyptian cotton is mainly grown. While the local varieties are somewhat less susceptible, so far no resistant strain has been found, but in Transcaucasia the King-Karayazskaya 915 strain exhibits the lowest susceptibility. Under Central Asiatic conditions it was determined that the yield of plants affected with stem gummosis [black arm] is reduced on the average by 60 per cent. of that of healthy plants, while the yield of plants affected with the angular leaf spot form of the disease is reduced by 36 per cent.

Disinfection of cotton seed with sulphuric acid was introduced in the U.S.S.R. in 1930, and field experiments in Central Asia showed that plants raised from treated seed developed 3·7 per cent. gummosis at the first leaf and 4·7 per cent. at the blossoming stages, as against 15·8 and 21·1 per cent., respectively, in controls. In further tests the treatment, effected by hand (as described in a sheet of instructions now in course of publication), was shown to be financially sound. In view of

the costliness of the sulphuric acid treatment, a search was made to find cheaper disinfectants, among which dusting with AV [the composition of which is not given], copper carbonate, calcium arsenate, and a few other dusts gave good results, and steeping in a 1 in 100 formalin solution was shown to be very effective. In infected areas, seed treatment must be supplemented by flooding of the soil [loc. cit.], the removal of infected plant material and deep ploughing immediately after harvest, and careful roguing out of all infected seedlings when thinning the stands in the spring. Insect vectors of the bacterium were not found in either of the two regions examined.

Petch (T.). **Contributions to the flora of Tropical America: XX.**—*Kew Bull. Misc. Inform., 1934*, 5, pp. 202–205, 1934.

Taxonomic notes are given on twelve species of entomogenous fungi collected by P. Richards on the Oxford University Expedition to British Guiana in 1929. The list comprises two species each of *Hypocrella* and *Aschersonia*, six of *Cordyceps*, and one each of *Ophiocordyceps* and *Stilbum*.

Bourne (A. I.) & Shaw (F. R.). **Notes on fungus attacking Onion thrips.**—*Journ. Econ. Entom.*, xxvii, 4, pp. 860–861, 1934. [Abs. in *Rev. Appl. Entomol.*, Ser. A, xxii, 11, p. 650, 1934.]

Large numbers of onion thrips (*Thrips tabaci*) found in 1932 on onion leaves in Massachusetts were completely filled with the mycelium of *Empusa* (?) *sphaerosperma* [*R.A.M.*, vii, p. 322]. The fungus was subsequently found to be well distributed throughout the onion-growing section of the Connecticut River Valley, where its development in many fields coincided with a sharp decline in the incidence of thrips about mid-August. Adverse weather conditions during the corresponding period in 1933 prevented a similar effect of the fungus.

Rozsypal (J.). **Houby na háďátku Řepném Heterodera schachtii Schmidt v moravských půdách.** [Fungi on the Beet eelworm *Heterodera schachtii* Schmidt in Moravian soils.]—*Bull. Czecho-Slovak Acad. of Agric.*, x, 6–7, pp. 413–422, 1 pl., 8 figs., 1934. [German summary.]

Many of the beet eelworm (*Heterodera schachtii*) cysts isolated from the soil in a sugar beet field in Moravia contained dead eggs and larvae, permeated by the mycelium of three fungi, which were apparently identical with the organisms briefly described in 1930 from the Ukraine in a preliminary communication in Russian by I. I. Korab (Výsledky prozkumu háďátka řepného *Heterodera schachtii* Schmidt, získaně v laboratoři biolocerkovské [Results of the investigation of the beet eelworm, *Heterodera schachtii* Schmidt, conducted at the laboratory in Bielaya Tzerkov], 1930) under the names *Torula heteroderae* n. sp., *Olpidium nematodae* Skwortzoff (*Arch. f. Protistenkunde*, lvii, 1927), and *Protomycopsis* sp. A specimen of *T. heteroderae* which was sent to the Centraalbureau voor Schimmelcultures in Baarn was referred there to *Trichosporium populneum* Lamb. & Fautr. [*Rev. Mycol.*, p. 145, 1896]. This fungus is stated to be the one that occurs the most frequently in the cysts, and a detailed morphological and cultural description is given of it by the author. The fungus referred to *Protomycopsis* is characterized

by large (70 to 100 μ), round, yellowish chlamydospores with an almost smooth or very faintly warty exospore; the chlamydospores are borne terminally on lateral branches, measuring 50 to 100 by 7 to 11 μ, of the main hyphae. The main and lateral hyphae also frequently bear thin, hyaline processes, but it was not possible to determine whether these finally formed long clamp-connexions by anastomosis or developed into some kind of haustorium. *O. nematodae* is stated to be of rare occurrence in the Moravian material.

Almon (Lois) & Stovall (W. D.). **Serologic reactions of cultures of Monilia and of some other yeastlike fungi.**—*Journ. Infect. Dis.*, lv, 1, pp. 12–25, 1934.

Of a number of species of *Monilia* and related genera investigated by direct agglutination procedures, only two cultures of *Torula* were entirely specific in their antigenic characteristics. Absorption of *M.* [*Candida*] *albicans* or *M. candida* [*C. vulgaris*] antisera by *Mycoderma* or *Endomyces* cultures left antibodies for species of *Monilia* only. Absorption of *Mycoderma*, *Endomyces*, *Saccharomyces*, and *Willia* antisera by the three species of *Monilia* tested (*M. parapsilosis* [*R.A.M.*, xiii, p. 370] and the two mentioned above) deprived these sera of agglutinins effective for the *Monilia* group, but left some capacity to agglutinate cultures of the other fungi used in the studies. Absorption of *M. parapsilosis* antisera by *C. albicans*, *C. vulgaris*, or *S. cerevisiae*, if the serum showed no titre for *C. albicans* or *C. vulgaris*, left the sera specific for *M. parapsilosis*. *C. albicans* and *C. vulgaris* behaved as identical organisms so far as absorption was concerned.

Slagsvold (L.). **Spesiell soppifeksjon i huden hos gjet og sau (favus).** [Peculiar fungoid infection in the skin of goats and sheep (favus).]—*Norsk Vet. Tidsskr.*, xlv, pp. 361–373, 8 pl., 1933. (English summary.) [Abs. in *Veter. Bull.*, iv, 8, pp. 504–505, 1934.]

From crusts on the head, ears, neck, back, and the flexor aspects of the joints, which are common as a skin disease of sheep and goats much exposed to damp in western Norway, the author isolated a fungus, probably a *Monilia*, which occurred in the thickened layers of the epidermis and in culture formed very small colonies with long filamentous offsets, the hyphae measuring 2 to 4 μ in diameter at the centre and about 0·5 μ at the periphery. The hyphae tend to divide into refractive segments. Inoculations with pure cultures of the organism produced characteristic lesions on sheep, goats, horses, cattle, guinea-pigs, rabbits, rats, and mice. The fungus remained capable of developing in dried skin and in culture for six months at room or cold storage temperature, but was killed by heating for half-an-hour at 65° C.

Terai (T.). **Ueber die Dermatomycosen in dem neuen unabhängigen Staat 'Manchoukuo' und über die mycologischen Studien an denselben. (3. Mitteilung.)** [On the dermatomycoses in the new independent State, Manchukuo, and on the mycological studies of the same. (Note 3.)]—*Journ. Orient. Med.*, xxi, 2, pp. 277–286, 5 figs., 1934. [Japanese, with German abstract on p. 23.]

Four species of fungi were isolated from the seven different clinical

forms of dermatomycosis involving 187 patients in northern Manchuria (Manchukuo) in 1933, namely, *Microsporon japonicum* (the most prevalent) [*R.A.M.*, xii, p. 290], *Trichophyton interdigitale*, *T. purpureum* [*T. rubrum*: ibid., xiii, p. 769], and *T. violaceum* [see next abstract].

Artom (M.). **Tricofizia universale con formazioni tumorali da Trichophyton violaceum e glabrum.** [General tricophytosis with tumoral formations due to *Trichophyton violaceum* and *glabrum*.]—*Giorn. Ital. di Dermatol.*, lxxv, 1, pp. 222–223, 1934.

A 49-year-old woman at Verona had been suffering for about 9 years from progressive trichophytosis, starting with peeling of the scalp and developing into inflammation and tumours round the ears and head, extending downwards to the chest and hand. Hyphae isolated from the tissues and blood-stream evolved on various media into *Trichophyton violaceum*, whereas those recovered from hair and epidermal squamae consistently yielded *T. glabrum* [*R.A.M.*, xi, p. 373; xiii, p. 577].

Milochevitch (S.). **Contribution à l'étude du Trichophyton persicolor.** [Contribution to the study of *Trichophyton persicolor*.]—*Ann. de Parasitol. Humaine et Comp.*, xii, 4, pp. 289–295, 1 pl., 1934.

The author gives brief clinical notes on two cases of ringworm, caused by *Trichophyton persicolor* [*R.A.M.*, vii, p. 634], observed by him in Sofia, in one of which the fungus produced endothrix lesions in the beard of the patient. Similar lesions were also produced in guinea-pigs inoculated with the organism. For these reasons he considers that *T. persicolor*, which hitherto was believed to belong to the microides group [ibid., xiii, p. 577], should be referred to the endothrix group [ibid., x, p. 243]. The fungus was grown on Langeron's and Milochevitch's natural media [loc. cit.], on which it produced terminal spirals and crosier-like hyphae.

Acton (H. W.) & Ghosh (L. M.). **Tinea imbricata (tokelau) in Bengal.**—*Indian Med. Gaz.*, lxix, 8, pp. 426–430, 2 pl. (1 col.), 1934.

An account is given of a case (stated to be the first in an Indian of the plains) of tinea imbricata (tokelau) [*R.A.M.*, x, p. 105], a disease which is said to have originated in the Malay Peninsula and has spread to the Pacific Islands, China, Java, Borneo, New Guinea, and Ceylon. Infection in the case under observation may have been contracted from Assam hill tribesmen, among whom the disease is reported to be common. The causal organism appears to occur scarcely at all in a saprophytic form in nature and can only be cultivated in the laboratory from absolutely fresh scrapings, which give good growth on Czapek's medium and other standard substrata. It is characterized by typical faviform colonies, single or concatenate arthrospores, and terminal or intercalary chlamydospores; colour and 'duvet' formation vary greatly with the medium. The creation by Castellani of a distinct genus (*Endodermophyton*) for the causal organisms of tinea imbricata and similar affections [ibid., x, pp. 243, 665] does not seem to the writers to be justified on botanical grounds, and they prefer to name the present organism *Achorion concentricum* Blanchard, 1901 [= *Trichophyton concentricum*: loc. cit.] or alternatively, *A. indicum* Cast., 1911 [cf. also ibid., xiii, p. 512].

Weise (E. C.). **Another case of sporotrichosis in Connecticut.**—*New England Journ. of Med.*, ccxi, 8, pp. 353–356, 6 figs., 1934.

From ulcers on the leg of a 34-year-old male patient the writer isolated on Sabouraud's maltose agar a fungus characterized by buff-tan to smoky-brown, rugose colonies, radiating from the centre to the periphery; septate, branching hyphae, 2 to 3 μ in diameter; and hyaline, ovoid conidia, 5 by 3 μ, borne in profusion on all parts of the mycelium, either in clusters at the tips of short lateral branches or densely along the side of the main hypha, forming a sleeve-like sheath. The organism was identified as *Sporotrichum schenckii* [*R.A.M.*, xii, p. 569]. This is believed to be the third case of sporotrichosis recorded in Connecticut.

Young (W. J.). **Pigmented mycotic growth beneath the nail.**—*Arch. of Dermatol.*, xxx, 2, pp. 186–189, 6 figs., 1934.

A brief account is given of a black, linear growth, $\frac{1}{8}$ in. wide, extending from the matrix to the tip of the finger-nail in a male patient and causing very severe pain. Cultures from the affected part on Sabouraud's agar were characterized by a dense, black pigment, a vegetative mycelium consisting of smoke-coloured hyphae with numerous septa, and smoke-coloured, pluriseptate conidia formed in terminal heads on single conidiophores. The fungus was identified as *Acrothecium nigrum*.

Focosi (M.). **Ueber einen für den Menschen pathogenen Stamm von Cephalosporium.** [On a strain of *Cephalosporium* pathogenic to man.]—*Zentralbl. für Bakt.*, Ab. 1 (*Orig.*), cxxxii, 3–4, pp. 237–240, 3 figs., 1934.

Referring to van Beyma's reported discovery of a new *Cephalosporium* (*C. stuehmeri*) pathogenic to man [*R.A.M.*, xiii, p. 238], the writer points out that an apparently identical fungus had previously been isolated by him from two cases of ophthalmic disease in Italy (*Boll. Ocul.*, pp. 554, 1250, 1934, ref. in *Zentralbl. für Ophthalm.*, xxviii, p. 362; xxix, p. 95).

The Italian organism is characterized by whitish-pink, felty colonies with a raised centre and radial furrows; hyaline hyphae 2·5 to 5 μ in diameter; and conidiophores 17 to 50 by 3 μ, tapering towards the distal end and bearing at the apex round heads 12 by 12 μ, composed of oval, fusiform, or curved conidia, 4 to 8 by 3 to 4 μ. Prof. Pollacci considered this fungus, which is pathogenic to guinea-pigs, to be identical with *C. serrae* Maff., isolated by Serra from a corneal ulcer (*Ateneo parm.*, i, 6, 1929) and studied in detail by Maffei in the same year [*R.A.M.*, ix, p. 593]. It is considered that van Beyma's name, *C. stuehmeri*, is antedated by *C. serrae*.

Zach (F.). **Untersuchungen über einige neue Arten der Gattung Scopulariopsis Bainier.** [Studies on some new species of the genus *Scopulariopsis* Bainier.]—*Oesterr. Bot. Zeitschr.*, lxxxiii, 15, pp. 173–186, 10 figs., 1934.

Full morphological, physiological, and cultural details, supplemented by Latin diagnoses, are given of five new species of *Scopulariopsis* [cf. *R.A.M.*, xiii, p. 578] isolated from human skin and nails in Vienna,

namely, *S. fusca*, *S. albo-flavescens*, *S. sphaerospora*, *S. oidiospora*, and *S. atra*. No definite statement can be made at present regarding the pathogenicity of these fungi.

Ocfemia (G. O.). **Bunchy-top of Abacá: its nature and control.**—*Philipp. Agric.*, xxiii, 3, pp. 174–186, 6 figs., 1934.

This is a revision of the writer's previous article 'The bunchy-top of Abacá and its control' (1931) [*R.A.M.*, xi, p. 183] and embodies the results of recent researches on the symptoms, etiology, control, and transmission of this highly destructive disease of abacá [*Musa textilis*] in the Philippines [ibid., xiii, p. 443].

Walter (Marta). **Ein gefährlicher Feind unserer Rosen.** [A dangerous enemy of our Roses.]—*Ratschläge für Haus, Garten, Feld*, ix, 8, pp. 136–137, 1 fig., 1934.

Attention is drawn to the prevalence in the Munich district of Germany of rose mildew [*Sphaerotheca pannosa*], primarily on warm south and south-east walls and in places exposed to the trickling of water from roofs. Presumably the enhanced transpiration of the leaves under full solar radiation is accompanied by a decline of turgescence in the cells, which are thus rendered more susceptible to the fungus [*R.A.M.*, xii, p. 715]. In addition to suitable fertilizing [brief recommendations for which are given] and other cultural measures, repeated applications of solbar during the summer have given good control of the disease [cf. ibid., xii, p. 733].

Stapp (C.). **Eine Bakteriose an Chrysanthemen.** [A bacteriosis of Chrysanthemums.]—*Zentralbl. für Bakt.*, Ab. 2, xc, 14–19, pp. 320–329, 3 figs., 1934.

In 1932 a leaf disease of large-flowered chrysanthemums (*Chrysanthemum indicum*) was investigated in pot plants sent from a Westphalian market-garden, where the Deutsche Kaiserin and Sax Export varieties were particularly severely affected, Monument and Pulling being relatively resistant.

Black discolorations extended for varying distances from the tips towards the centres of the older, irregularly pinnate leaves and also occurred here and there in the middle of the lamina. Gradual desiccation ensued, the affected areas assuming a brownish tinge and becoming distorted. In the diseased tissues zoogloeal accumulations of bacteria occurred between the palisade cells. The organism was isolated from the infected material and cultured on a number of standard media. It is a Gram-negative rod with up to five polar flagella, measuring after two days on bouillon agar at 26° C. 1·2 to 3·6 by 0·6 to 0·8 μ (average 1·8 to 3 by 0·6 to 0·7 μ). Gelatine is liquefied and milk peptonized; nitrates are reduced; neither acid nor gas is formed on various carbon compounds; α-alanin is the best source of nitrogen, closely followed by asparagin. Slow growth commenced at 0°; upwards of 5·1° there were indications of fluorescence, which became pronounced between 20° and 28° (the optimum range for development); at 31° a slight decline was perceptible and growth ceased at 42°. The thermal death point was found to lie between 48° and 49°.

The typical symptoms of the disease were reproduced by inoculations with pure cultures of the bacterium on chrysanthemums, the leaves of which contracted infection not only through wounds but also by way of the stomata. Among a number of other phytopathogenic, fluorescent bacteria tested on the highly susceptible Deutsche Kaiserin, *Pseudomonas syringae* [see above, p. 16] produced similar symptoms to those caused by the chrysanthemum organism, while conversely the latter proved capable of attacking lilac, the leaf-tips of which showed discoloration and necrosis. Serological experiments further demonstrated the identity of the chrysanthemum bacterium with *P. syringae*.

Control measures should be based on the avoidance of excessive warmth and atmospheric humidity, supplemented by spraying with Burgundy mixture.

KAVEN (G.). **Schwarzbeinigkeit bei Stiefmütterchen.** [Blackleg in Pansies.]—*Blumen und Pflanzenbau verein. mit Gartenwelt*, xxxviii, 34, p. 433, 1934.

Pythium de Baryanum is stated to be a common agent of blackleg or root rot [damping-off] in pansies [*Viola tricolor*] in Germany [cf. *R.A.M.*, vi, p. 360]. The sole means of combating this disease is stated to be soil disinfection with 40 per cent. formaldehyde, applied at the rate of $\frac{1}{4}$ to $\frac{1}{2}$ l. in 100 l. water per sq. m. The soil should be covered for a week after treatment and before sowing the seed, and should not be dug after disinfection owing to the risk of bringing the fungus to the surface.

DODGE (B. O.). **Controlling the Hollyhock rust.**—*Journ. New York. Bot. Gard.*, xxxv, 416, pp. 186–189, 1 fig., 1934.

A brief, popular note is given on the life-history of hollyhock rust (*Puccinia malvacearum*) [*R.A.M.*, xii, p. 782; xiii, p. 306] and on its control by timely applications (in March or April, as soon as the young foliage appears) of a superior grade of dusting sulphur, e.g., pomogreen [ibid., xii, p. 25]. It is of the utmost importance to treat the seedlings at a very early age, when they are about 5 to 6 in. high, the outcome of fungicidal applications at a later stage of growth having been very disappointing in recent tests in New York. After flowering all the aerial parts of the plants should be destroyed to prevent infection of the new leaves developing in the late summer and autumn.

NOACK (E.). **Fliederkrankheit und Fliederveredlung.** [Lilac disease and Lilac grafting.]—*Blumen und Pflanzenbau verein. mit Gartenwelt*, xxxviii, 33, pp. 420–421, 1934.

German phytopathologists are engaged on the investigation of an infectious lilac disease of which the cause so far remains obscure. On a visit to Holland the writer was impressed by the relative infrequency of the disease, which may possibly be attributed to the difference between Dutch and German grafting methods. In Holland it is the custom to graft high, inserting the scion 30 cm. up the stem, whereas in Germany low grafting is the rule. It is obvious that in the latter method the scion is exposed at the base to injuries during cultural operations as well as to softening of the tissues by rain. An attempt should at any rate be made to combat the infection by the means suggested.

LEVINE (M.). **Experimental production of crown gall on Opuntia.**—*Phytopath.*, xxiv, 8, pp. 929–937, 6 figs., 1934.

Of the several species of *Opuntia* inoculated with *Bacterium tumefaciens* following the isolation of the latter from the tree cactus (*Carnegiea gigantea*) in Arizona [*R.A.M.*, xii, p. 358], only one, *O. keyensis*, developed a walnut-sized crown gall in the course of a year. The others apparently lack the protective mechanism which leads to overgrowth formation in many dicotyledonous plants in response to the introduction of the tumour-producing organism.

OETTINGEN (H. v.). **Die Perlschnur- (Sklerotien-) Krankheit der Gräser.** [The 'string of pearls' (sclerotial) disease of grasses.]—*Nachricht. über Schädlingsbekämpf.*, ix, 2, pp. 86–89, 1934. [English, French, and Spanish summaries on pp. 106, 108, 111.]

Attention is drawn to the prevalence of *Sclerotinia* [*Sclerotium*] *rhizodes* [*R.A.M.*, xiii, p. 382] on *Phalaris arundinacea* during the recent succession of dry years in Germany, where it was first officially recorded in 1901. The damage is particularly severe on farms in the eastern plains, where the immense meadows that used to yield 30 to 40 zentner of hay per morgen [up to 3 tons per acre] are now scarcely worth mowing. It has been observed that the disease does not occur on areas subject to regular spring and winter flooding, and it is therefore recommended that where possible the ground water-level should be artificially raised and an appropriate fertilizer applied, the nature and quantity of which must depend on local conditions. By these means the yield may be increased by as much as a ton per acre. The popular name, 'string of pearls', proposed for the disease is suggested by the long rows of white, spherical sclerotia covering the leaves at an advanced stage of infection.

PAPE (H.). **Kleekrebsbekämpfung. Keine zu rasche Wiederkehr von Klee—Anbau von Kleegrasgemischen.** [Clover canker control. No over-hasty recurrence of clover—cultivation of Clover-grass mixtures.]—*Mitt. Deutsch. Landw.-Gesellsch.*, xlix, 24, pp. 521–522, 2 figs., 1934.

Following up his previous investigations on clover canker (*Sclerotinia trifoliorum*) in Germany [*R.A.M.*, x, p. 669], the writer discusses the means of combating the disease, which is stated frequently to destroy 75 per cent. or even the whole of the crop. The sclerotia of the fungus have been found to persist for at least 4½ years in the soil in a viable state, so that a reasonably lengthy crop rotation is of considerable importance. Other precautions should include the use of seed of suitable origin (that from southern Europe not being adapted to German conditions); mixed cultivation of clover and grass, e.g., crimson clover [*Trifolium incarnatum*] or serradella [*Ornithopus sativus*] and Italian rye grass [*Lolium italicum*], Swedish [alsike] clover [*T. hybridum*] and timothy [*Phleum pratense*], and the like; invigoration of the stand by top-dressings of kainit and basic slag (up to March) and later of ammonia-superphosphate and potash salt; and deep ploughing-under of plant remains.

GOOSSENS (J.). **Onderzoek naar de eerste infectiebron van Appel en Pereschurft.** [An investigation on the primary source of infection by Apple and Pear scab.]—*Tijdschr. over Plantenziekten*, xl, 8, pp. 174–176, 1934.

This is a preliminary note on the writer's investigations in Holland on the primary source of infection by apple and pear scab [*Venturia inaequalis* and *V. pirina*], which fully substantiated the observations of Dillon Weston and Petherbridge [*R.A.M.*, xiii, p. 245] that it is mainly from overwintered conidia, the role of the ascospores being evidently quite subordinate.

HORNE (A. S.). **Biological work on fruit.**—*Dept. Sci. & Indus. Res., Rept. Food Invest. Board for the year 1933*, pp. 228–245, 2 pl., 6 graphs, 1934.

Further investigations confirmed the author's previous observation that penetration of apples by various fungi tested took place through the lenticels [*R.A.M.*, xiii, p. 106]. With a given population of Worcester Pearmain apples, of the fungi tested for power of overcoming external resistance the most active was *Phomopsis coneglanensis*, followed in descending order by *Penicillium expansum*, *Fusarium* [*lateritium* var.] *fructigenum*, *Botrytis cinerea* strain 8, *Sphaeropsis* sp. (New Zealand), *Monilia* [*Sclerotinia*] *fructigena*, and *Trichothecium roseum*. In a test of the effect of apple variety on penetration by five species of fungi, Worcester Pearmain and Bramley's Seedling apples showed, respectively, 91·7 and 37·9 per cent. successful penetrations.

When Worcester Pearmain and Bramley's Seedling apples, each from two plots, one of which had received balanced manurial treatment for ten years while the other had remained untreated, were inoculated with *F. lateritium* var. *fructigenum* D. and *Cytosporina ludibunda* C. E., respectively, and stored at laboratory temperatures, the Worcester Pearmain apples from the unmanured plot in two successive years showed more resistance than those from the manured plot, while with Bramley's Seedling apples the fruit from the unmanured plot was not consistently more resistant than that from the manured plot.

With Lane's Prince Albert apples, East Malling stocks X and VI [cf. ibid., xiii, p. 708] gave fruit, respectively, highly resistant and susceptible to the storage rot caused by *C. ludibunda*, though with Bramley's Seedling apples the reverse obtained.

LINDQUIST (J. C.). **Nota sobre la podredumbre amarga de la Manzana (Glomerella cingulata (St.) v. Schr. y Sp.).** [Note on the bitter rot of the Apple (*Glomerella cingulata* (St.) v. Schr. and Sp.).]—*Rev. Fac. Agron. Univ. Nac. La Plata*, xix, 3, pp. 398–406, 5 figs., 1933. [Received October, 1934.]

An account is given of the symptoms, mode of infection, and morphological and cultural characters of *Glomerella cingulata*, the agent of bitter rot of apples [*R.A.M.*, xiii, p. 523], which was first observed in the Argentine in 1929. Positive results were given by inoculation experiments with pure cultures (on potato-glucose agar) on oranges, peaches, cherries, pears, and quinces. Diseased material should be destroyed and preventive treatments of 2 per cent. Bordeaux mixture applied.

Brooks (C.) & Harley (C. P.). **Soft scald and soggy break-down of Apples.**—*Journ. Agric. Res.*, xlix, 1, pp. 55–69, 4 figs., 4 graphs, 1934.

The results of the experiments briefly described in this paper, which were conducted from 1930–3 in the State of Washington and in Virginia, indicated in agreement with those obtained by earlier investigators that soft scald and soggy [low temperature] breakdown of apples [*R.A.M.*, x, pp. 39, 115 and next abstract] are greatly increased by delayed storage, and that the extent of the increase usually varies with the length of the delay; it was further found that this factor also increases the resistance of the apples to remedial treatment. Soggy breakdown (but not soft scald) was somewhat reduced by gradual cooling of the fruit before placing in storage. The tests showed that the accumulated tendencies, whether resulting from delayed storage or whether inherent in the fruit at harvest, towards soft scald were largely removed by coating the fruit with a 50–50 oil-paraffin mixture, or by exposure for a short time before storing to partial vacuum, to high temperature (95° to 110° F.), or to carbon dioxide gas; the last-named treatment also checked the accumulated tendencies to soggy breakdown. Under the condition of the experiments this treatment favourably influenced the firmness of the fruit, without exerting an objectionable effect on its flavour and quality. It is believed, therefore, that it may serve as a basis for commercial control of both conditions where it is desired to hold the apples at the usual cold storage temperature of 32° F. [cf. ibid., xii, p. 102].

Kidd (F.) & West (C.). **The cause of low temperature breakdown in Apples.**—*Dept. Sci. & Indus. Res., Rept. Food Invest. Board for the year 1933*, pp. 57–60, 2 graphs, 1934.

After pointing out that the development of low-temperature breakdown [see preceding abstract] in apples in cold storage depends not on temperature alone, but also on the stage of maturity reached by the fruit when placed in storage [*R.A.M.*, viii, p. 253], the authors describe an experiment in which large numbers of Bramley's Seedling apples were, after gathering, stored at 50° F. and removed to 34° at successive intervals, the carbon dioxide production of one sample being followed at 50° from the time of gathering onwards. The results obtained [which are expressed graphically] showed that the fleshy tissues broke down sooner when the fruit was placed in cold storage at the peak of the climacteric rise in respiratory activity than when it was so stored before or after this stage. A further test, in which the apples were stored from the outset at 34° and individual samples were transferred to 50° at successive intervals, indicated that prolonged exposure to low temperatures may decrease liability to fungal rotting, either because fruit with incipient breakdown becomes less susceptible to rotting by fungi or because the fungal activity is reduced by long exposure to low temperatures. In both experiments, breakdown and fungal wastage were as a rule mutually exclusive in the same apple.

KIDD (F.) & WEST (C.). **The control of superficial scald of Apples.**—*Dept. Sci. & Indus. Res., Rept. Food Invest. Board for the year 1933*, pp. 199–204, 1934.

In an experiment conducted to ascertain the influence of the rate at which water is lost upon the development of scald [*R.A.M.*, xiii, p. 108] on Newton Wonder apples, strictly comparable samples were stored in a single layer unwrapped at 37·5° F. in a small wind-channel apparatus receiving air at average relative humidities of 89·7, 95·7, and 97·6 per cent. of saturation on entry, the rate of air movement being 2·3 cm. per minute. After 109 days, much less scald was present on the apples from the driest atmosphere than on those from the more humid ones.

When various types of wrapping papers in 10 in. square sheets were tested, the only quality which appeared significantly to influence the development of a late browning of the skin on Belle de Boskoop apples (typical scald did not develop in this test) was weight, heavy papers with or without oil giving better control of the skin browning than did light papers. In a test of the effect of the quality of the oil used no significant difference was observed between highly refined oils from viscosity 820 to 135 seconds; these controlled skin browning when the amount used was 0·06 gm. per sheet; with 0·12 gm. rather less control resulted. When less refined oils were used, 0·06 gm. gave slight, and 0·12 gm. no, control.

KIDD (F.). & WEST (C.). **The effect of root-stock on the keeping quality of Bramley's Seedling Apples.**—*Dept. Sci. & Indus. Res., Rept. Food Invest. Board for the year 1933*, pp. 204–205, 1934.

When Bramley's Seedling apples from 15-year-old trees worked on East Malling rootstocks [see above, p. 40] types IX (dwarfing), II (semi-dwarfing), I (semi-vigorous), and XVI (vigorous) were stored at 34° F. the commercial storage life of the apples from the different root-stocks was, respectively, 20, 14, 20, and 21 weeks, after which wastage was almost entirely due to low-temperature breakdown, fungal attack being negligible.

BARTHELET (J.). **Sur une pourriture des Poires due à un champignon Discomycète Phacidiella discolor (Mont. et Sacc.) Poteb.** [On a Pear rot due to a Discomycetous fungus *Phacidiella discolor* (Mont. et Sacc.) Poteb.]—*Ann. des Epiphyties*, xix, 6, pp. 357–368, 3 pl., 8 figs., 1933. [Received November, 1934.]

This is an extended account of the writer's studies on the pear rot caused by *Phacidiella discolor* in France, the essential points of which have already been summarized from another source [*R.A.M.*, xiii, p. 585].

MALHERBE (I. DE V.). **Little leaf or rosette of fruit-trees.**—*Farming in South Africa*, ix, 101, pp. 312–313, 315, 2 figs., 1934.

Little leaf or rosette of fruit trees [*R.A.M.*, v, p. 167] is stated to occur in practically every orchard district in the western Cape Province, South Africa, apricot, plum, apple, and pear all being affected, while in Klein Drakenstein a mottle leaf, apparently of the same type as that described from America on deciduous fruit trees [ibid., xii, p. 434; xiii, p. 692],

has been observed on orange and mandarin. In a Banhoek orchard it was noted that plum trees grafted on Marianna rootstocks were practically free from the disorder in a low-lying orchard, whereas those on yellow peach growing beside the former were seriously affected. Good results have been obtained by the application to the soil round four-year-old plum trees just before blossoming of 4 or 5 lb. of zinc sulphate [ibid., xiii, p. 39] and of 5 or 8 lb. round older trees. The preparation costs about 3d. per lb.

Fish (S.). **Brown rot control.**—*Fruit World of Australasia*, xxxv, 7, pp. 367–368, 1934.

Tests conducted since 1926 in Victoria conclusively demonstrated the importance in the control of brown rot of stone fruits [*Sclerotinia fructicola*: *R.A.M.*, xiii, p. 110] of destroying all mummified fruits and infected wood before applying dormant sprays. Sodium orthodinitrocresol gave promising results in preventing sporulation on infected twigs overlooked in pruning, and was toxic to aphid eggs.

On injured peaches infection develops during pre-cooling and in ice-trucking in Sydney; peaches sound when arriving at the market, but dispatched from heavily infected orchards readily develop brown rot when exposed to the temperatures of the market. Under the temperature and moisture conditions prevailing at the agents' stands peaches with a heavy spore load on the skin develop the disease in less than the five days required by the dealers for distribution and consumption.

Control measures tentatively recommended for peaches are as follows: (1) remove every mummified fruit from the trees before applying any dormant spray; (2) when burning pruned infected wood also destroy as many mummies found on the ground as possible; (3) plough the ground after pruning and before applying dormant sprays; (4) until more information is available concerning the new spray mentioned above apply lime-sulphur 1 in 10 in the late dormant period and self-boiled lime-sulphur or a convenient substitute at petal-fall, when the fruit is half-grown, and one month before picking. An application of Bordeaux mixture 12–8–80 should be made after pruning and again at the late pink bud stage. Fruit cover sprays cannot be applied to apricots without injury.

Pear black spot [scab: *Venturia pirina*: ibid., xii, p. 296] may be controlled by applying Bordeaux mixture 12–8–80 just after the young folded leaves protrude from the bud, again when they have separated from the unopened blossom bud, and at half this strength about three weeks after the fruit has set. Lead arsenate may be added after the Bordeaux mixture has been made. Under Goulburn Valley conditions a modified schedule would probably be effective, consisting of a full-strength application at the white bud stage and one at half-strength three weeks after setting.

Koch (L. W.). **Studies on the overwintering of certain fungi parasitic and saprophytic on fruit trees.**—*Canadian Journ. of Res.*, xi, 2, pp. 190–206, 3 pl., 1 fig., 1934.

Evidence is given from experiments in Ontario to show that the conidia of the black knot fungus (*Dibotryon morbosum*) [*R.A.M.*, xii, p. 704]

can survive the winter in a viable condition on plum and cherry. The fungus was further isolated repeatedly during the winter from chlamydospores on plum buds and bark. In pure cultures on potato-dextrose agar chlamydospore production by *D. morbosum* occurred only in proximity to certain bacteria and *Cephalothecium* [*Trichothecium*] *roseum* [cf. ibid., xii, p. 109] or on the introduction into the Petri dishes of a drop of sulphuric acid or copper sulphate. Chlamydospore formation was also induced on plum twigs by the germination of black knot conidia in close association with a strain of bacteria originally isolated from the same host.

Cladosporium carpophilum was several times isolated from chlamydospores on the bark of Late Crawford peaches. Chlamydospores were also produced in culture and on twigs; a histological study of the latter revealed the presence of two types of lesion, namely, primary ones formed by early infections during the summer and secondary extensions made in the following winter by the migration of the mycelium beyond the barriers of periderm delimiting the primary lesions [cf. ibid., xiii, p. 37]. Late infections, on the other hand, rarely induced periderm formation and were not succeeded by secondary winter spread. *Taphrina deformans* was isolated during the winter from the surface of peach buds and its viability conclusively demonstrated by inoculation experiments [ibid., xiii, p. 452].

A species of *Coniothyrium* was frequently isolated during the winter from chlamydospores from the buds and bark of plum, peach, cherry, apple, pear, and *Prunus pennsylvanica*. Chlamydospores were further produced in culture by various other organisms on plum, cherry, and related hosts, e.g., *Torula*, *Cladosporium*, *Hormodendrum*, and *Fumago* spp. All the foregoing evidence points to the generally unrealized importance of chlamydospores in the perpetuation of various groups of fungi and emphasizes the need for the fungicidal treatment of fruit trees during the dormant period.

BODINE (E. W.). **Occurrence of Peach mosaic in Colorado.**—*Plant Disease Reporter*, xviii, 10, p. 123, 1934. [Mimeographed.]

A severe outbreak of peach mosaic, first recorded from Texas [*R.A.M.*, xii, p. 37], is reported from Mesa County, Colorado, where some of the orchards contain up to 100 per cent. infected trees. Eradication work is in progress.

PARHAM (B. E. V.). **Annual Report on Banana Disease Investigations, 1933.**—16 pp., [Fiji], 1934.

During the last twenty years the most virulent banana disease in Fiji, restricting the growth and preventing the proper maturation of the fruit, has been 'sigatoka' disease or leaf spot (*Cercospora musae*) [*R.A.M.*, xii, p. 456; xiii, p. 112, and next abstract]. Since 1931 infection has spread, and is now very widely distributed, constituting a serious menace to growers. In 1932 about 40 per cent. of the fruit destined for export was rejected at the packing stations owing to the disease, equivalent to a loss of £60,000.

The disease was present in every area inspected, in many localities to a marked degree, even in comparatively recent plantations; as a rule,

in the older ones all the plants were affected. The areas at present occupied by plantations rendered unproductive as a result of infection are probably as extensive as those that are still producing marketable fruit. This represents an annual loss of potential crop valued at £90,000.

During their entire life affected plants show a continuous, abnormal destruction of leaves, and when the bunch is produced there is a rapid failure of the final leaves which results in almost complete defoliation of the plant before the fruit has reached maturity. The bunch either fails to develop normally, or if it reaches the three-quarter stage, individual fruits begin to ripen prematurely, and on being broken across, the green fruit shows characteristic discoloration and other symptoms. This abnormal ripening is associated with a rapid collapse and decay of the main stalk and the early development of cushion and finger rots. The application of vaseline to the cut stalk ends failed to prevent this condition.

The root systems of infected plants are greatly reduced, and those roots left are very unhealthy. The dead and decaying leaf bases are frequently subject to bacterial rots and to attack by *Marasmius* sp. which is found on the plant from ground-level upwards, killing the leaf bases and also affecting the pseudostem [cf. ibid., xiii, p. 251].

No differences in varietal resistance were observed among susceptible plants, Veimama and Cavendish bananas [*Musa cavendishii*] being about equally affected, but Blue Java, Lady's Finger, and certain plantain [*M. paradisiaca*] varieties show marked immunity. Under the prevailing conditions not even a single ratoon crop can be expected with certainty from susceptible varieties in any but the best soils.

The available evidence gives further support to the view that no direct correlation exists between the degree of leaf spot infection and the incidence of *Cosmopolites sordidus* borers.

Susceptibility is closely correlated with the water relations of the roots as they affect turgidity. Infection is favoured particularly by lack of water brought about by drought or by the death of the rootlets and root hairs as a result of waterlogging or other causes.

On one occasion Cavendish plants from which the fruit had been cut were found almost defoliated by diamond spot (*Scolecotrichum musae*) [ibid., xiii, p. 787] and rust (*Uromyces musae*), but except for two overmature bunches all the fruit from these plants was free from the symptoms associated with leaf spot and was accepted by the packers.

Spraying from May to December, consistent large-scale stripping, and manuring all have failed to control leaf spot.

Bunchy top [ibid., xiii, p. 642] was responsible for the poor condition of many banana plants, particularly those of the Cavendish variety.

WARDLAW (C. W.). **Banana diseases. IX. The occurrence of Sigatoka disease (Cercospora musae Zimm.) on Bananas in Trinidad.**—*Trop. Agriculture*, xi, 7, pp. 173–175, 2 pl., 1934.

The author reports the recent discovery of the banana leaf spot caused by *Cercospora musae* [see preceding abstract] on the Governor (Dwarf Cavendish) and Giant Governor [*Musa cavendishii*] varieties in the Maqueripe district of Trinidad, where the disease was also observed on the Gros Michel and Bande varieties. This is stated to be the first record

in the Western tropics of the fungus, the identity of which with the organism occurring in Queensland and in Fiji was confirmed by the Imperial Mycological Institute. Although restricted to one locality alone in Trinidad, the intensity of the spotting on the two Governor varieties and the destruction of the leaf tissue are sufficient indications of the potentialities of the outbreak, and steps have been taken for its eradication in the light of control measures recommended by other workers, a brief summary of which is given. All infected leaves are being stripped and burned together with all banana leaf debris on the ground.

West (E.). **Anthracnose of Mango.**—*Florida Agric. Exper. Stat. Press Bull.* 463, 2 pp., 1934.

A popular note is given on the symptoms of mango anthracnose (*Colletotrichum gloeosporioides*) [*Glomerella cingulata*: *R.A.M.*, xii, p. 521], which is stated to be a limiting factor in production in rainy or foggy seasons. Control presents considerable difficulties owing to the abundance of infective material, especially on the highly susceptible flower clusters which are most in need of protection. The treatment recommended consists of eight applications of 3–3–50 Bordeaux mixture plus calcium caseinate, beginning as the flower buds swell and extending at lengthening intervals of 4 to 21 days over a period of some three months.

West (E.). **Papaya leaf spot.**—*Florida Agric. Exper. Stat. Press Bull.* 462, 2 pp., 1934.

A serious disease of papaws in Florida, where this crop is stated to be gaining in importance, is the leaf spot caused by *Puccinіopsis* [*Asperisporium*] *caricae* [*R.A.M.*, ix, p. 230], which produces pale or yellowish spots covered on the under side with the minute, raised, brownish-black fructifications of the fungus, often arranged concentrically. In severe cases defoliation may ensue, with adverse effects on the size, quality, and yield of the fruit. Control may be readily effected by the destruction of infected material and weekly applications of 3–3–50 Bordeaux mixture plus calcium caseinate, beginning with the expansion of the leaf blades and continuing for at least six weeks.

Thompson (A.). **A disease of the Durian tree.**—*Malayan Agric. Journ.*, xxii, 8, pp. 369–371, 1934.

Durian (*Durio zibethinus*) trees in Penang for about ten years have been observed to be liable to develop claret-coloured bark cankers. There is no external indication of a fungus in the bark until a dark exudate appears from one or more spots on the trunk, sometimes near or at the collar. Boring beetles attack the bark at these spots. Dull red areas bounded by an irregular margin are formed, extending inwards as far as the wood of the stem. The canker spots become larger and may coalesce, until a considerable portion of the bark is killed and becomes riddled with the holes of boring beetles. A tree may not die until a year after infection has occurred.

From the cortex of a diseased tree *Phytophthora palmivora* was isolated, inoculations with which reproduced the early stage of the condition in seven days, the fungus being reisolated from the infected material.

As the disease is likely to spread to rubber adjoining the durian trees and vice versa, growers should inspect their trees periodically, remove and burn any diseased bark, and disinfect the wounds.

GORYAÏNOFF (A.). Острое оружие химии на защиту урожая.—[Chemistry as a keen weapon in crop protection.]—*На Защиту Урожая* [*Crop Protection*], *1934*, Moscow, pp. 5–7, 1934.

In this brief paper the author mentions the considerable advance made since 1930 in chemical industries in U.S.S.R., and particularly in the home production of new fungicides and insecticides, and also of foreign patented preparations, e.g., kupfer-meritol against downy mildew [*Plasmopara viticola*] and insect pests of the vine, germisan, uspulun, &c., the formulae of which have been determined. Up to that year the Union was practically entirely dependent on foreign countries in regard to most of the important chemicals used in plant protection, the importation of which from 1922 to 1926, inclusive, amounted to 3,800,000 gold roubles [£380,000], while at the present time their importation is claimed to have been reduced to a minimum, and a start is said to have been made in the export to foreign countries of a few of the home preparations. Among the new fungicides locally manufactured, mention is made of the placing on the market in 1931 of AB dust [*R.A.M.*, xii, p. 617] for cereal seed-grain disinfection against smuts, superseded in 1932 by Davydoff's preparation, in which copper carbonate is replaced by an arsenical salt [see above, p. 22]; at the present time the testing has been completed of a further cereal seed disinfectant, containing much less arsenic, in the form of organic arsenic, and called talc-arsin [loc. cit.], which was shown to be fully as effective as the former. A new preparation termed 'ultra-sulphur' is claimed to be effective against certain cotton and vine diseases [not specified] and to contain one-tenth of the sulphur in the common pure sulphur dusts, while the quantity required of each is the same for the same areas treated. Finally, attempts are now being made to find a substitute for copper among the by-products derived from the calcination of sulphurous pyrites.

NIKIFOROFF (A.). Техническое перевооружение системы ОБВ.—[Technical rearmament of the OBV system.]—*На Защиту Урожая* [*Crop Protection*], *1934*, Moscow, 1, pp. 9–11, 7 figs., 1934.

This is a brief enumeration of some new apparatus for the control of parasitic diseases of plants, which have been introduced in the U.S.S.R. since the initiation in 1930 of the OBV system (Pan-Soviet Association for the control of injurious agents in Agriculture and Silviculture). The first large-scale apparatus ABV–1 constructed in 1930 by G. I. Korotkikh and S. D. Popoff and capable of disinfecting up to 12 tons per hour of cereal seed-grain, was superseded in 1933 by three types of apparatus of Popoff's construction, one of which combines the dust, semi-dry, and liquid treatments, and is capable of treating up to 10 tons of seed per hour by the dusting, and up to 5 tons by the semi-dry, method. Its distinctive feature is that it is almost entirely constructed of wood, and that the disinfectant dust or liquid is fed into the machine automatically. Still another seed-disinfecting machine of smaller capacity (2 to 3 tons

per hour) has been devised by Professor Borghardt, and is now being tested for practical performance. Under trial is also a machine constructed by Mikhailoff-Sienkewicz, Popoff, and Stepanoff, for the treatment with sulphuric acid of cotton seed.

In 1933 the 'Vulcan' Mechanical Works constructed the first Russian horse-driven dusting apparatus and a horse-driven spraying machine. In 1932 Sneigour constructed the first large-volume automatic sprayer, brand S, and in 1933 the Gorkovsky Automobile Works devised a powerful sprayer which is mounted on a 1·5 ton lorry and is capable of spraying an area of 60 hectares per working day. The same works have also devised a sprayer of the Rochester type, which is attached to a tractor and is worked by a power take-off from the latter; the machine is designed to spray orchard trees, and gives a spray column up to 12 m. in height and from 1 to 1·5 m. in diameter; and also a combined orchard and field tractor-sprayer with a tank of 800 l. capacity, working under a pressure of 25 atmospheres. Mention is also made of some further improved models of dusting and spraying machines now under construction or trial.

Kisser (J.) & Portheim (L.). **Versuche über die Verwendbarkeit von Wasserstoffsuperoxyd als Saatgutbeizmittel.** [Experiments on the use of hydrogen peroxide as a seed disinfectant.]—*Phytopath. Zeitschr.*, vii, 4, pp. 409–426, 1934.

Promising results have been obtained in laboratory experiments [details of which are given] in Vienna in the disinfection of vegetable, cereal, and ornamental seeds by quantities ranging from 2 to 32 per cent. of the weight of the seed of commercial solutions containing 15, 20, or 30 per cent. hydrogen peroxide [cf. *R.A.M.*, xi, p. 483].

The larger quantities of disinfectant were used for rough or otherwise disinfection-resistant seeds such as beet seed clusters, and the smaller quantities for smooth seeds (peas, beans, *Brassicae*, and the like). For the cereals intermediate quantities were used. In many cases complete disinfection was secured without injury to the seeds; of the cereals tested, barley and oats were much less susceptible to damage than rye and wheat, but they were not completely disinfected by any of the concentrations used. Rye is also difficult to disinfect completely by this means, but wheat was better. One drop of a spore suspension of *Tilletia tritici* [*T. caries*] was placed for 20 minutes in ten drops of 1, 5, 10, 20, or 30 per cent. hydrogen peroxide, thoroughly washed, and sown on agar moistened with a dilute solution of calcium nitrate. The spores treated with the three highest concentrations of the peroxide were killed and those exposed to the disinfectant at 5 per cent. partially inactivated, while the minimum strength was ineffective. Wheat seed-grain heavily infested with *T. caries* spores and immersed for 3 hours in 6 or 12 per cent. by weight of a solution of 30 or 15 per cent. H_2O_2, respectively, was completely freed from infection, which occurred abundantly, on the other hand, in a control series steeped in pure water. The pulses and maize were relatively easy to disinfect but the *Brassicae* were uncertain and rough seeds like those of tomato and cucurbits required large quantities of solution. Beet seeds were not fully disinfected by any of the treatments.

Grochowska (Zofja). **Wpływ środków grzybobójczych na kiełkowanie zarodników szarej pleśni Cebuli, Botrytis allii Munn.** [Effect of fungicides on the germination of the conidia of Onion grey rot, *Botrytis allii* Munn.]—*Wydawnictwa Skoly Glownej Gospod. Wiejsk. w Warszawie* [*Trans. Chief School of Agric. in Warsaw*], i, pp. 101–119, 1934. [English summary.]

A brief account is given of preliminary experiments on the effect on the germination of the conidia of *Botrytis allii* [*R.A.M.*, xii, p. 610] of soap, copper sulphate, Burgundy mixture, lime-sulphur, and solbar. The results showed that the conidia were much more resistant to the action of the fungicides in nutrient solution hanging drops than in nutrient agar cultures. Of the substances and concentrations tested, 1 per cent. soap emulsions alone almost completely inhibited the germination of the conidia in hanging drops. In agar cultures the germination was completely suppressed by a 0·5 per cent. copper sulphate solution, while in hanging drops a 10 per cent. solution was not sufficient to kill all the spores. All the other fungicides tried were shown to be of considerably lesser efficacy.

Săvulescu (T.). **Pflanzenschutz und phytopathologische Organisation in Rumänien.** [Plant protection and phytopathological organization in Rumania.]—Issued by *Min. für Landwirtsch. u. Domänen Landwirtsch. Forsch.-Inst. von Rumänien*, 57 pp., 11 figs., 1 graph, 1394.

An account is given of the organization of the Rumanian phytopathological service, which was established in 1927 and is divided into three sections: one at Bucharest (headquarters), an entomological branch, and the phytopathological station of Bessarabia at Chisinău. Affiliated research centres include four phytopathological laboratories belonging, respectively, to the Silvicultural Research Institute, the Plant Breeding Station at Cluj, the Tobacco-Growing and Fermentation Institute, Bucharest-Baneasa, and the Head Agricultural Chamber, besides two local advisory stations for vine mildew [*Plasmopara viticola*] control.

The plant protection service, dating only from 1st April 1933, has already taken in hand the eradication of the barberry with a view to the control of *Puccinia graminis*, which was responsible for heavy damage in 1932 and 1933 [*R.A.M.*, xii, p. 426; xiii, p. 152], besides organizing a mass campaign for the spraying of fruit trees.

The text of the Rumanian phytosanitary legislative measures from 1868 onwards is given, and an appendix contains a list of Rumanian and foreign disinfectants of proved utility.

Christoff (A.). Способъ за хващане на разнасянитѣ чрезъ вѣтъра спори. [Apparatus for catching wind-borne spores.]—*Journ. Agric. Exper. Stations in Bulgaria*, Sofia, vi, 3–4, pp. 41–48, 1 diag., 1934. [English summary.]

A summarized account is given of the construction and use of a spore-catching apparatus devised by the author for the special purpose of determining the date of the first appearance in the air each year of

the spores of particular plant pathogens. The apparatus was tested during the spring of 1933 in orchards in Bulgaria, and is claimed to have given excellent results in detecting the first spores to appear of *Monilia* [*Sclerotinia*] *cinerea*, *Clasterosporium carpophilum*, *Polystigma rubrum* [*R.A.M.*, xiii, p. 453], and *Venturia inaequalis* (ascospores and conidia).

PETERSEN (H. E.). **Wasting disease of Eelgrass (Zostera marina).**—*Nature*, cxxxiv, 3378, pp. 143–144, 1934.

The destruction of eelgrass (*Zostera marina*) from wasting disease in Danish waters in the summer of 1933 [*R.A.M.*, xiii, p. 793] continued during the following winter, but the young leaves formed in the spring were generally healthy, infection reappearing in the early part of the summer. In June, 1934 organs (apparently perithecia) producing long spores were found in *Zostera* rhizomes in the northern Kattegat, and it is evidently to these that fresh infections are due. It seems probable, from the high incidence of the fungus in Danish waters, associated in places with the virtual extinction of the eelgrass, that the fungus is the cause of the wasting disease.

The systematic position of the organism is still obscure. The spores are long, flexible, and reminiscent in shape of those of *Ophiobolus* [ibid., xiii, p. 716]; they do not, however, appear to fall into fragments, while the ascus walls undergo very early dissolution. If the Danish fungus is identical with *O. maritimus* Sacc. [see next abstract] the species should be transferred to another genus.

TUTIN (T. G.). **The fungus on Zostera marina.**—*Nature*, cxxxiv, 3389, p. 573, 1934.

Ophiobolus halimus Diehl et Mounce, recently described as occurring on *Zostera marina* on the Atlantic coast of North America [*R.A.M.*, xiii, p. 716], has been found during the summer of 1934 in several localities of Devon, the north coast of Guernsey, and Lough Ine, Ireland [loc. cit.]. A recent comparison by E. J. Butler of the British and North American material has established the identity of the fungus in both lots of specimens.

It was at first thought that the organism under observation might be *O. maritimus* recorded on the same host by Saccardo [see preceding abstract], but a re-examination by Prof. E. Ulbrich of the type specimen in Berlin showed that the leaf on which this fungus occurred belonged to a grass, probably *Elymus*, but certainly not *Zostera*. This identification was later confirmed by examination of the type lent to the Kew Herbarium. An error on Saccardo's part, due perhaps to a misunderstanding of the statement on the cover by P. Magnus, who collected the specimen, that it was 'unter *Zostera*', has been responsible for the incorrect record of *O. maritimus* on the grass-wrack seaweed. Assuming that *O. halimus* is also the organism under investigation by H. E. Petersen, its known distribution is parts of the Atlantic coast of North America, south-west England, Channel Islands, and Denmark. Experiments on the pathogenicity of *O. halimus* are in progress at the Marine Biological Association's laboratory at Plymouth.

Otero (J. I) & Cook (M. T.). **Partial bibliography of virus diseases of plants.**—*Journ. Agric. Univ. Puerto Rico* (formerly *Journ. Dept. Agric. Puerto Rico*), xviii, 1–2, pp. 5–410, 1934.

This valuable compilation contains a large number of titles of the more important contributions to the subject of virus diseases in plants [*R.A.M.*, xiii, p. 530], accompanied in many cases by a brief indication of the scope of the work. No claim to completeness is made and the writers would welcome additional material and corrections for inclusion in a forthcoming supplement, all correspondence to be directed to the junior author.

Drake (C. J.), Martin (J. N.), & Tate (H. D.). **A suggested relationship between the protoplastic bridges and virus diseases in plants.**—*Science*, N.S., lxxx, 2067, p. 146, 1934.

The onion yellow dwarf virus [*R.A.M.*, xiii, p. 146] is stated to have been transferred from diseased to healthy plants in Iowa by over 75 species of aphids. In tracing the course of the stylets of the aphid's beak it was occasionally observed, e.g., in *Myzus persicae* and *Aphis rumicis*, that the content of a cell adjacent to the intercellular path of the stylet appeared to have been partially extracted without any puncture of the walls. Protoplasmic bridges (plasmodesms) between adjacent cells in the onion were from a few to 60 μ or more in diameter. Even in regions where the plasmodesms were few, the aphid stylets traversing the middle lamella intercellularly could scarcely avoid contact with them. The insect would thus be able to inoculate the cell content without puncturing the wall.

Sheffield (F[rances] M. L.): **Experiments bearing on the nature of intracellular inclusions in plant virus diseases.**—*Ann. of Appl. Biol.*, xxi, 3, pp. 430–453, 3 pl., 1934.

The author describes the intracellular changes occurring in Solanaceous plants affected with tomato aucuba mosaic virus and the disease caused by Hy III virus [*R.A.M.*, xii, pp. 243, 526], and compares them with the cytological effects of tobacco mosaic. In plants affected with the two former viruses inclusion bodies are formed by the aggregation and fusion of minute particles in the cytoplasmic stream, whereas with tobacco mosaic an amoeba-like X-body is produced and after some weeks suddenly disappears; it is accompanied by striate material which ultimately fuses into one large body.

In attempts to reproduce these conditions in healthy cells of Solanaceous plants by means of coagulating agents almost all the reagents used induced a stimulation of the cytoplasmic stream similar to the initial sign of virus infection. All the cytological abnormalities due to aucuba mosaic or Hy III virus were reproduced with salts of molybdic acid [ibid., xii, p. 526], while lactic acid induced the formation of bodies resembling the X-bodies of tobacco mosaic but persisting only for a few hours.

Efforts to inhibit the formation of the inclusion bodies in virus-diseased plants by treatment with various chemicals gave negative results.

The results of these experiments support the view that the intracellular inclusions of plant virus diseases are essentially products of the host cell.

A bibliography of 20 titles is appended.

KUPREWICZ (V. F.). К физиологии больного растения. Физиологические данные о вредоносности некоторых грибных и вирусных болезней культивируемых растений. [Contribution to the physiology of diseased plants. Physiological data on the injury caused to cultivated plants by some fungus and virus diseases.]—*Thesis Acad. of Sciences U.S.S.R., Bot. Inst.*, Leningrad, 71 pp., 1 fig., 10 graphs, 1934. [English summary.]

A comprehensive report is given of the author's investigations of the changes caused in the normal physiological processes of healthy plants under the influence of certain fungal and virus diseases, the material studied consisting of *Cirsium arvense* infected with *Puccinia suaveolens*, Victoria field peas infected with *Mycosphaerella pinodes*, *Trifolium hybridum* infected with *Erysiphe communis*, and potato affected with mosaic, aucuba mosaic, and leaf roll. Basing his conclusions on the mass of experimental data obtained, he states that such changes consist in general of a decrease in the chlorophyll content and in the energy of photosynthesis (the latter in cases of sharply expressed disease symptoms), increased or decreased intensity of respiration, retarded translocation of assimilates, increased transpiration, disturbed osmotic pressure in the infected tissues, and a decrease in the accumulated organic matter. A bibliography of 159 titles is appended.

MAY (O. E.) & HERRICK (H. T.). **Some practical and theoretical aspects of mold metabolism.**—*Journ. of Bact.*, xxviii, 2, pp. 145–151, 1934.

A brief review is given of some outstanding researches on the production by moulds of chemical products of commercial utility, namely, citric, gluconic, kojic, and gallic acids and industrial alcohol [cf. *R.A.M.*, x, p. 46; xi, p. 119 *et passim*].

POHJAKALLIO (O.). **Significance of different sugars as nutrient media for some rusts.**—*Suomen Maataloustieteelisen Seuran Julkaisuja*, xxv, pp. 1–94, 1932. [Finnish, with German summary in original. Abs. in *Biol. Abstracts*, viii, 7, p. 1650, 1934.]

Cut stems of *Festuca pratensis* naturally infected by rust (*Puccinia* sp.) and placed with their bases immersed in glucose, fructose, saccharose, and maltose solutions developed many more and larger uredosori than the controls in water [cf. *R.A.M.*, ii, pp. 13, 361]. In another series of tests, portions of leaves of *F. pratensis*, *F. rubra*, *Poa pratensis*, oats, and wheat were removed after natural infection but before the appearance of sori, and it was found that all the rusts sporulated much more profusely when the leaves were then placed in sugar solutions, especially at a relatively low concentration (2 per cent.), than when placed in water. Electrometric acidity determinations showed in most of the tests an intense acidification of the solutions, apparently leading to hydrolysis of the disaccharides.

Half of a *F. pratensis* plant was protected from the light and after

four days' exposure of the other half to daylight it was found that portions of leaf from the covered part produced many more spores in sugar solutions than in water. The sori produced on the foliage in water were much smaller in the part kept in darkness than in light, whereas in a glucose solution no difference was observed. After six days during which half of each plant was covered, the rust sori were only half as large on the covered leaves and new ones developed only on foliage exposed to the light. A Danish variety of *F. pratensis* showing a high degree of resistance in plot trials developed small sori in a 4 per cent. glucose solution in fourteen days but none in water.

Phragmites communis, *Calamagrostis epigea*, *F. pratensis*, and oats were inoculated with aecidiospores of *P. phragmitis* [ibid., vi, p. 336], *P. coronata calamagrostis*, *P. coronifera festucae*, and *P. coronifera avenae* [*P. lolii*: cf. ibid., xii, pp. 274, 364]. Five to seven days later noticeable colour changes were shown by the leaves in both water and sugar solutions and penetration occurred with equal facility in both. Sporulation, however, was much more abundant in sugar than in water. Sori were formed in every place where the colour had changed but were very small on the leaves in water and developed a day later than in sugar.

The sugar content of *F. pratensis* leaves in the late summer (the period of rust attack) was found to be higher than in the early part of the season when the disease is absent. All the four varieties of *F. pratensis* used in the tests are more liable to infection with an increase in their sugar content.

HAENSELER (C. M.). **Beneficial fungi.**—*N*[*ew*] *J*[*ersey*] *Agric.*, xvi, 2, pp. 6–7, 1934. [Abs. in *Exper. Stat. Rec.*, lxxi, 3, p. 331, 1934.]

Experiments still in progress are stated to have shown the antagonistic action of a species of *Trichoderma* towards the damping-off fungi *Rhizoctonia* and *Pythium* when a culture of the former was added to cucumber seed-beds contaminated by either of the latter [*R.A.M.*, xi, p. 350; cf. also xiii, p. 391]. The *Trichoderma* was found to produce a substance directly toxic to *Rhizoctonia*, which is destroyed by ten minutes' exposure to a temperature of 80° C., ten days' ageing, and five minutes in an atmosphere of pure oxygen.

PIESCHEL (E.). **Ueber eine weisssporige Uredoform eines Rostpilzes und über die Entstehung zusammengesetzter Uredopusteln.** [On a white-spored uredo form of a rust fungus and on the origin of composite uredo pustules.]—*Phytopath. Zeitschr.*, vii, 4, pp. 393–398, 6 figs., 1 diag., 1934.

In the autumn of 1931 a white-spored uredo form of *Melampsora euphorbiae* f. sp. *pepli* (*M. helioscopiae* f. sp. *pepli*) [*R.A.M.*, ix, p. 601] was found on *Euphorbia peplus* in a restricted area of south Hanover. The uredosori were pure white and the spores, paraphyses, and germ-tubes hyaline, so that the orange pigment typical of the normal uredo stage of the rust was evidently absent. The albino strain, which showed a reduced germinative capacity as compared with the normal, maintained its character in greenhouse cultures on the host covering a period of two years, and it was further disseminated by field inoculations over a radius of 40 to 60 m. from the place of origin. The white-spored

form was particularly virulent towards *E. peplus* plants from the district in which it was discovered and the surrounding country, a high degree of resistance being shown, on the other hand, by specimens from Brunswick. Composite uredo pustules, from which both yellow and white spores developed, were obtained by mixed inoculations with the normal and albino forms.

FOLSOM (D.). **Potato virous diseases in 1933.**—*Amer. Potato Journ.*, xi, 9, pp. 235–242, 1934.

A bibliography is given of recent American and European literature (1932–3) on potato virus diseases, comprising 133 titles, on the lines of the compiler's previous surveys [*R.A.M.*, xiii, p. 257].

MORGENTHALER (O.). **Die Blattrollkrankheit der Kartoffel, eine Infektion oder eine Ernährungsstörung?** [Leaf roll disease of the Potato, an infection or a nutritional disturbance?]—*Mitt. Naturforsch. Gesellsch. Bern, 1933*, pp. xxxxiv–xxxxv, 1934.

The history of potato leaf roll during the last thirty years or so may be divided into three sections, the first comprising the early years of the present century up to the outbreak of the world war, during which an attempt was made to determine the nature of the disease and to work out measures for its control; the second, beginning during the war, was marked by the application of virus theories to the problem; while the third, embracing the last six or seven years, has seen the development of the ecological hypothesis of degeneration [see next abstract]. All these modes of approach to the question have proved fruitful in different ways; their outcome is briefly summarized in the light of contemporary studies [to which reference has been made from time to time in this *Review*].

KLAPP (E.) & SPENNEMANN (F.). **Strichelkrankheit und Scheinabbau der Kartoffel. Versuch der Analyse eines Falls schwerer, fortschreitender Wuchsstörungen.** [Streak disease and pseudo-degeneration of the Potato. An attempted analysis of a case of severe, progressive growth disturbances.]—*Pflanzenbau*, xi, 2, pp. 67–78, 6 figs., 1934.

Full details are given of an investigation, covering the period from 1930–3, of certain cases of absolute failure of the Industrie and Edeltraut potato varieties near Darmstadt (Hesse). From a consideration of all the factors involved the writers conclude that the disorders (which simulated those associated with streak disease) [*R.A.M.*, xiii, p. 797 and next abstract] actually represented the combined effects of adverse environmental conditions acting on an impaired constitution [cf. ibid., xiii, p. 178], the influence of virus diseases, if present, being of minor importance.

VERHOEVEN (W. B. L.). **Invloed van Zeeuwsche Blauwen op Eerstelingen.** [The influence of Zeeuwsche Blauwe on Eerstelingen.]—*Tijdschr. over Plantenziekten*, xl, 8, pp. 173–174, 1934.

In 1933 the influence of the Zeeuwsche Blauwe potato variety (which harbours the streak [*R.A.M.*, x, p. 746; xiii, pp. 179, 320, 464] virus in a masked form and itself incurs no damage from the disease) was tested on 92 Eerstelingen [Duke of York] plants grown in immediate

proximity. During the growing season 17 (18 per cent.) of the latter contracted primary streak symptoms and were lifted separately. A number of the stored tubers from these plants were so severely infected about the eyes that no sprouts were formed. Of the 56 plants derived from the remaining sprouted tubers 39 (69 per cent.) were diseased. Tubers were also saved from the 75 Duke of York plants showing no streak symptoms and 194 were planted out. Of the resulting plants 59 (33 per cent.) developed streak, which is not confined, therefore, to individuals showing external manifestations. It is thus of the utmost importance to isolate Zeeuwsche Blauwe, its two bud mutants, Zeeuwsche Bonte and Westeinder Blauwe, as well as Thorbecke and Bloemgraafje, all of which are latent carriers of streak, from other varieties in the Dutch potato fields.

GLYNNE (MARY D.). **Infectivity of summer sporangia of Potato wart disease in incipient infections on varieties immune in the field.**—*Nature*, cxxxiv, 3381, p. 253, 1934.

Potato varieties which in the field appear to be immune from wart disease (*Synchytrium endobioticum*) may, under laboratory conditions, develop a transitory form of infection, the summer, and occasionally the winter, sporangia developing in a normal manner until necrotic areas produced in the host interfere with the nutrition of the fungus and cause it to be sloughed off. Inoculations on the susceptible Arran Chief variety from such incipient infections bearing summer sporangia which developed in the laboratory on Snowdrop, Bishop, and Ben Cruachan (apparently immune in the field) gave positive results.

MAGEE (C. J.). **A new dip for Potato scab.**—*Agric. Gaz. New South Wales*, xlv, 8, pp. 441–442, 5 figs., 1934.

Excellent control of potato scab (*Actinomyces scabies*) as well as of *Rhizoctonia* disease [*Corticium solani*] has been obtained in New South Wales by the treatment recommended by G. H. Cunningham [*R.A.M.*, xii, p. 651], which consists in dipping the seed for ten minutes in a solution made by stirring 4 oz. mercuric chloride in 2 pints of commercial hydrochloric acid and diluting to 25 galls. The solution may safely be used for ten treatments, and if the duration of the dipping is then increased to fifteen minutes, for a further five. The potatoes should be immersed unbagged and afterwards dried. The process may be carried out some months before planting, and the total cost of the chemicals required to treat one ton of seed amounts locally to three shillings.

NORMAN (A. G.). **The biological decomposition of plant materials. Part IX. The aerobic decomposition of hemicelluloses.**—*Ann. of Appl. Biol.*, xxi, 3, pp. 454–475, 1934.

Continuing his studies on the biological decomposition of plant materials [*R.A.M.*, xii, p. 533], the author tested nearly seventy common fungi, mostly species of *Aspergillus* and *Penicillium*, for their ability to utilize on agar plates the crude hemicellulose from oat straw [ibid., xi, p. 263]; all grew reasonably well, the majority at least as well as on glucose. Occasionally a cleared zone due to an exo-enzyme was produced round the colony.

Twenty aerobic bacteria [the morphological and biochemical characters of which are described] capable of utilizing hemicelluloses were isolated from soil, manure, and straw; three were thermophilic. All utilized a very wide range of sugars and polysaccharides, and one group produced some acid and gas. Differentiation was obtained on saccharic acid and certain disaccharide acids. Fermentation tests showed that in pure culture none of the organisms actively decomposed hemicellulose either isolated or *in situ* in straw.

It is concluded that fungi are more active than bacteria in the natural decomposition of hemicellulose and that the ability to decompose cellulose is probably general among common fungi. A bibliography of 9 titles is appended.

Boshart (K.). **Die Krankheiten und Schädlinge der wichtigsten Arznei- und Gewürzpflanzen.** [The diseases and pests of the principal drug and spice plants.]—*Nachricht. über Schädlingsbekämpf.*, ix, 2, pp. 57–82, 6 figs., 1934. [English, French, and Spanish summaries on pp. 105, 107, 110.]

The writer summarizes very briefly the available information, supplemented by some personal observations in Germany, on the diseases and pests of a number of useful drug and spice plants. A bibliography of 50 titles is appended.

Cane disease resistance trials.—*Australian Sugar Journ.*, xxvi, 5, p. 263, 1934.

Writing in a recent issue of the *Cane Growers' Quart. Bull.*, A. F. Bell discusses and tabulates the results of some disease reaction trials conducted by the (Queensland) Bureau of Sugar Experiment Stations [cf. *R.A.M.*, xiii, pp. 324, 728]. The seedlings Q. 2 and 3 D. and the P.O.J. varieties 2878, 2940, 2727, 2714, and probably 2722 and 2875, are in general too susceptible to be grown in districts where red stripe top rot [*Phytomonas rubrilineans*] is prevalent. P.O.J. 2725, on the other hand, is highly resistant to this disease.

On account of their susceptibility to downy mildew [*Sclerospora sacchari*] P.O.J. 2940 and 2878 are considered to be unsuitable for the Lower Burdekin district. Here again the outcome of trials with P.O.J. 2725 was much more promising.

D'Emmerez de Charmoy (D.). **Nouvelle contribution à l'étude du streak.** [A new contribution to the study of streak.]—*Rev. Agric. de L'Ile de la Réunion*, N.S., xxxix, pp. 193–202, 3 figs., 1934.

R.P. 8 sugar-cane in an experimental field in Réunion showed two forms of streak [*R.A.M.*, xii, p. 328; xiii, p. 595], one characterized by the usual leaf stippling, and the other, and much the more prevalent, by long, colourless, translucent bands sometimes reaching a length of several cm., but never more than 0·5 mm. broad except where several parallel bands coalesced laterally. The appearance of the canes showing the stippling was almost equal to that of the healthy canes, which were then 2 m. high, but the canes showing the leaf banding were checked in development, in some places being not much over 50 cm. in height.

Experimental evidence showed that, after infection, streak passes

through two stages, of which the first, characterized by stippling, has very little adverse effect on the plant, while the second, characterized by leaf banding, is a dangerous stage in which the virus has, presumably, attained its maximum activity.

Bourne (B. A.). **Studies on the ring spot disease of Sugarcane.**—*Florida Agric. Exper. Stat. Tech. Bull.* 267, 76 pp., 21 figs., 2 graphs, 1934.

The history and geographical distribution of the ring spot disease of sugar-cane ordinarily attributed to *Leptosphaeria sacchari* [*R.A.M.*, xii, p. 552] are reviewed and the economic importance of the disorder discussed both as affecting commercial cultivation and the breeding of new varieties. The symptoms and histological effects of the disease on the leaves, leaf sheaths, and stems, mainly on canes grown in Florida, are described. Isolations from the spots made at various stages of their development yielded a number of organisms, but the results of inoculations with these were positive only in the case of *Helminthosporium ocellum* [ibid., xiii, p. 654], which must therefore be considered the primary cause of the disease. The ring spot symptoms, which in Florida usually appear in December and January on susceptible varieties, are emphasized by the subsequent development of such saprophytes as *Phyllosticta sorghina* Sacc. (with which *P. sacchari* Speg. [ibid., ii, p. 340; vi, pp. 148, 601; ix, p. 808], *P. panici* Young, and *P. hawaiiensis* Caum [ibid., i, p. 194] are considered to be identical) and *L. sacchari*. The other fungi commonly found on diseased plants, i.e., species of *Spondylocladium*, *Nigrospora*, and *Alternaria*, as well as a yellow bacillus, appear to be entirely without effect on the development of ring spot.

The spots on the leaf are at first minute, ivy-green to bronze-brown, and somewhat elongated. As they enlarge they become Burgundy or India red or Spanish raisin-coloured, with a distinct yellow areola. When fully developed the spot is somewhat irregular, 10 to 12 by 2·5 to 4 mm. in diameter and with a peach blow- to straw-coloured centre, the margin retaining the Spanish raisin tint. The yellow areola remains prominent at the ends of the spot, where it may measure 5 mm. or more in vertical extension as a narrow streak. On the sheaths and stem the spots are generally similar, though the coloured margin may be absent on the stem.

H. ocellum was observed to gain entrance to the leaves, sheaths, and stems through the epidermal wall, especially of the motor cells, and also through the stomata. Evidence was forthcoming that under carefully controlled conditions a mixture of *H. ocellum* and *P. sorghina* resulted in a more rapid development of lesions than that following inoculation with the former alone. *P. sorghina* has also been recorded on several other hosts, e.g., *Panicum maximum*, *P. dichotomiflorum* Michx. [*P. autumnale* Bosc], and sorghum, in association with ring spots primarily due to other fungi.

Proof was obtained of the genetic connexion between *L. sacchari* and a species of *Phyllosticta*, probably *P. saccharicola* Henn. The optimum temperatures for the growth of *H. ocellum*, *P. sorghina*, and *L. sacchari* were found to be 23·5°, 27°, and 21° C., respectively. Details are given of the physiological characters of *H. ocellum* and *P. sorghina* in relation to reaction (optima P_H 6·7 and 6·0, respectively), light, utilization of

carbohydrates, enzyme production, nitrogen fixation (negative), and the like. The former organism maintained its virulence in culture for 2½ years.

The host range of *H. ocellum* has been extended from varieties of *Saccharum officinarum* to include hybrids between this species and *S. spontaneum* and *S. barberi*. Moreover, although the sorghum varieties Texas Seeded Ribbon and Kansas Orange are apparently immune, a number of intergeneric hybrids between them and sugar-cane have been found susceptible to ring spot. Under Florida conditions the following sugar-cane varieties are highly susceptible to infection by *H. ocellum*: Otaheite, Louisiana Purple and Striped, Cavengire Rayada, Ba. 11569, B. 417, B.H. 10 (12), L. 511, D. 74 and 95, P.O.J. 2878 and 100, F. 29/382, H. 109, and Cristalina. Tolerance is shown by S.C. 12/4, P.O.J. 2714, 2725, 2883, 36–M, and 36, and C.P. 27/139 (in an exceptionally high degree), while great resistance is manifested by Badila, P.O.J. 213, Co. 213, 214, 281, and 290, C.P. 807 and 27/108, Uba, Chunnee, U.S. 1694, and F. 29/416 and 29/7. In seven years' breeding experiments, combinations with a high proportion of Chunnee (*S. barberi*) 'blood' have given rise to a greater degree of susceptibility among the progeny than those in which *S. spontaneum* is largely represented, this parent conferring on its offspring marked resistance to ring spot.

Bolle (P[ierrette] C.). **Over het tegenwoordige stand van het pokkah-boeng-vraagstuk.** [On the present status of the pokkah-boeng problem.]—*Arch. voor Suikerind. Nederl.-Indië*, Deel I, xlii, 15, pp. 435–440, 1934.

In this lecture, read before a meeting of the Cheribon subdivision of the Java sugar industry experiment station, some outstanding features of the pokkah-boeng disease of sugar-cane [*Gibberella moniliformis*: *R.A.M.*, xiii, p. 686] are discussed in the light of the author's investigations (still in progress).

Three phases of the disease are differentiated, viz., (1) leaf infections, (2) arrested growth, and (3) death. Pokkah-boeng is seldom observed to develop in cane under two or over seven months old. Even in artificial inoculation experiments under the most favourable conditions for the fungus the incidence of infection among older canes was very low, the heightened resistance being apparently correlated with structural or chemical changes in the plant. These are in their turn conditioned by the influence of fertilizers, the exact nature of which is not fully understood though nitrogen assimilation evidently plays an important part.

Pokkah-boeng (1) is most in evidence in December, but it actually originates in the previous month, coincident with the onset of heavy rains. The percentage of this form of the disease appears to decline in the later plantings (August and September). On the other hand, stage (3) is liable to reach a maximum in the later plantings, though here the results are conflicting and this aspect of the problem requires further investigation. In the meantime it is necessary to combine a judicious manuring scheme with correct planting times in such a way as to afford optimum growing conditions and ensure a desirable correspondence between the weather and the stage of development of the cane.

Lund (A.). **Studies on Danish freshwater Phycomycetes and notes on their occurrence particularly relative to the hydrogen-ion concentration of the water.**—*Kgl. Danske Vidensk. Selsk. Skr., Naturv. og Math. Afd.*, 9 Rœkke, vi, 1, 98 pp., 39 figs., 1934.

An annotated list is given of all the fresh-water Phycomycetes observed in Denmark during 1930–2, accompanied in the case of certain species new to science or to the country by detailed descriptions. The ecological relations of the fungi observed are discussed in some detail.

Yen (W. Y.). **Première note sur quelques Ustilaginés de Chine.** [A first note on some Chinese Ustilagineae.]—*Ann. de Cryptog. Exot.*, vii, 1, pp. 11–20, 2 pl., 1934.

Notes are given on some common smuts of cultivated plants in China. In discussing *Sphacelotheca sorghi* the author describes the spores as very finely warty, and not smooth, as is usually stated.

Miles (L. E.). **The rusts of Mississippi.**—*Plant Disease Reporter*, xviii, 6, pp. 54–73, 1934. [Mimeographed.]

An annotated list is given of 162 Uredinales occurring in Mississippi. Thirty-two species of rusts and 31 hosts are new records for the State.

Ito (S.). **Cultures of Japanese Uredinales I.**—*Bot. Mag.*, Tokyo, xlviii, 572, pp. 531–539, 1934.

Details are given of the writer's inoculation experiments with ten heteroecious rusts collected in Hokkaido, Northern Japan [cf. *R.A.M.*, xiii, p. 201]. Twenty-four species of *Thalictrum* were successfully infected by *Puccinia triticina* from wheat [ibid., xi, p. 629].

Fraser (Lilian). **An investigation of the sooty moulds of New South Wales. I. Historical and introductory account.**—*Proc. Linn. Soc. New South Wales*, lviii, 5–6, pp. 375–395, 1933.

After a discussion of earlier investigations into the composition, systematics, and physiology of the sooty mould fungi [cf. *R.A.M.*, x, p. 558; xiii, p. 186] the author states that the organisms concerned belong to the following groups: (*a*) Capnodiaceae, which include the chief and most characteristic members of the group, (*b*) Atichiaceae, of which the commonest species, *Atichia glomerulosa*, is a widespread constituent of these mould growths, and (*c*) Fungi Imperfecti, which are sometimes present to the exclusion of all others. Of this last group, *Dematium pullulans* and *Cladosporium herbarium* are the chief members.

In New South Wales, the sooty moulds *Capnodium salicinum* (= *Teichospora salicina* (Mont.) Gäum.) and *Antennularia scoriadea* are the commonest members of the first group. *Atichia glomerulosa*, *D. pullulans*, and *C. herbarum* also are widespread. Locally, there are two types of sooty mould, a perennial type which develops on perennial shrubs and trees, and an annual type found on annual herbs attacked by aphids. The former, which is by far the more common, and represents the highest development attained by the sooty mould community, consists of dominant members of the Capnodiaceae (of which only the two

mentioned above have been identified so far), together with *A. glomerulosa* (which is often found alone) and a variety of Fungi Imperfecti, especially *Cladosporium*, *Dematium*, and *Triposporium*. The latter consists exclusively of Fungi Imperfecti, the dominant fungus usually being *D. pullulans* or *C. herbarum*, others found including *Alternaria*, *Brachysporium*, *Asbolisia*, and *Epicoccum*.

Evidence is given that the various spore forms attributed by McAlpine to *Capnodium citricolum* do not all belong to the one species.

Fraser (Lilian). **An investigation of the sooty moulds of New South Wales. II. An examination of the cultural behaviour of certain sooty mould fungi.**—*Proc. Linn. Soc. New South Wales*, lix, 3–4, pp. 123–142, 59 graphs, 1934.

In a series of experiments conducted to ascertain whether appreciable differences exist between the Australian sooty moulds [see preceding abstract] and certain other moulds in their ability to utilize different classes of food material, the author grew *Botrytis cinerea*, *Penicillium expansum*, *Asbolisia* sp., *Cladosporium herbarum*, *Dematium pullulans*, *Caldariomyces* sp. (near *C. fumago* Woron.), *Capnodium* sp. (2 strains), and *Microxyphium* sp. A (2 strains), sp. B, and sp. C on various media, using the two first-named as controls and the rest as sooty mould representatives.

The results obtained [which are tabulated, expressed graphically, and fully discussed] showed that *P. expansum* and *C. herbarum* utilized a wide range of carbohydrates. The other fungi utilized pentoses, mannose, and lactose rather less well. Only *D. pullulans* and *B. cinerea* failed to grow on raffinose. All grew well on inulin, dextrin, and starch.

P. expansum used the widest range of nitrogenous compounds. *C. herbarum* grew satisfactorily on peptone, potassium nitrate, and sodium nitrate only. Asparagin caused pronounced staling of both. The Capnodiaceae grew moderately well on all nitrogenous media tested.

Fruiting was poor in all the fungi tested at low carbohydrate-nitrogen ratios when nitrogen was present in high concentrations.

Staling was marked in agars of moderate sugar and high peptone concentration, but much less so when sodium nitrate replaced peptone. As a rule, staling did not occur when the concentration of both sugar and nitrogen was high. Staling and decreased spore production appeared to be to some extent related.

Each species had a different optimum concentration and a different range of concentrations, both of carbohydrate and nitrogen, suitable for growth.

Wallace (G. B.). **Diseases of Tobacco.**—*Tanganyika Dept. of Agric. Mycol. Leaflet* 15, 7 pp., 1934.

Notes are given in semi-popular terms on the symptoms and control of the following tobacco diseases hitherto observed in Tanganyika: mosaic (recognized with certainty only in the Iringa Province but probably more widely distributed); leaf curl [*R.A.M.*, xii, p. 143]; wildfire (*Bacterium tabacum*) in the Songea district; mildew (*Erysiphe cichoracearum*) and frog-eye spot (*Cercospora nicotianae*), both prevalent

throughout the Territory [ibid., xii, p. 201]; and red rust [ibid., x, p. 585], another disorder of common occurrence associated with unduly low topping in a dry period followed by rain.

HOLMES (F. O.). **A masked strain of Tobacco-mosaic virus.**—*Phytopath.*, xxiv, 8, pp. 845–873, 5 figs., 1934.

A summary of the writer's experiments on the effects induced in various Solanaceous hosts by a completely masked strain of the tobacco mosaic virus in comparison with those produced by the common field type, which causes distortion of the host plant, has already appeared [*R.A.M.*, xiii, p. 399]. In the present paper reference is further made to tests with the so-called 'mild-mottling' strain, the symptoms induced by which were intermediate between those of the two extreme types under discussion. Mixtures of the distorting strain and the attenuated mottling and masked forms were readily distinguishable from single-lesion stocks of the first-named when as little as 1 per cent. of the admixture was present. Small inoculations of such stocks into healthy stem tissues incubated at temperatures just over 34° C. frequently gave rise to attenuated strains, the evidence suggesting that these attenuated strains arose from the old stock. The two principal differences between the distorting and attenuated strains were as follows. The latter were able to increase in the host tissues at temperatures sufficiently high to inhibit the multiplication of the former. The symptoms of the attenuated strains were less pronounced and slower to involve the tissues near the growing point than those of the original mosaic virus, resembling in this respect the relationship between the distorting strain and its symptomless carriers.

SCHMIDT (M.). **Immunitätszüchtung bei Tabak.** [Breeding for immunity in Tobacco.]—*Naturwissensch.*, xxii, 33, pp. 557–559, 1934.

Of 102 varieties, types, and strains of *Nicotiana tabacum* tested at the Kaiser Wilhelm Genetic Research Institute, Müncheberg, Mark Brandenburg, for reaction to tobacco wildfire (*Pseudomonas tabaci*) [*Bacterium tabacum*: *R.A.M.*, xii, p. 600], all proved susceptible, as also did nine varieties of *N. rustica*. *N. glutinosa*, *N. paniculata*, and *N. langsdorffii* were also attacked, whereas a form designated *N. viscosa* but probably identical with *N. langsdorffii* var. *longiflora* was resistant. A number of resistant forms occur among the section *petunioides*, including *N. affinis* (*N. alata* var. *grandiflora*), *N. micrantha*, and (in a lesser degree) *N. plumbaginifolia*, *N. fragrans*, and *N. speciosa*. *N. silvestris* is susceptible, *N. longiflora* only slightly so, while *N. sanderae*, in accordance with its hybrid origin, segregates into susceptible and slightly susceptible.

The use in inoculation experiments of a highly virulent strain of the pathogen isolated by Stapp resulted in rapid and heavy infection. Slightly susceptible varieties often present a somewhat aberrant type of infection, characterized by a small brown lesion encircled by a ring of minute, brown dots. In the field in 1933 it was observed that those varieties which were most susceptible in greenhouse tests contracted only slight infection. The mass infection of seedlings by Stapp's method gave very satisfactory results from the standpoint of selection, the

disease generally being so severe as to kill most of the batches of 200 to 400 plants. Of the resistant survivors, *N. affinis* was mostly used in further tests; it was found that infection is readily contracted by the first leaves, which, however, rapidly recover. Among the *N. sanderae* plants were 43 healthy, 45 severely diseased, and 7 killed, while the F_2 progeny of a cross between *N. tabacum* and *N. affinis* yielded 197 healthy and 164 killed.

The application of these data to further breeding experiments is briefly discussed.

Doolittle (S. P.) & Sumner (C. B.). **Probable occurrence of Australian spotted wilt of Tomatoes in Wisconsin.**—*Phytopath.*, xxiv, 8, pp. 943–946, 1 fig., 1934.

No recurrence of the tomato disease observed in Wisconsin in 1931 and tentatively identified with Australian spotted wilt [*R.A.M.*, x, p. 414] has taken place, but in view of similar reports from California and Oregon [ibid., ix, p. 275; xiii, pp. 278, 807], the symptoms which lead the authors to consider that the Wisconsin disease was spotted wilt are described and illustrated.

Borissoff (P. N.). Грибные вредители Кавказских древесных пород, их хозяйственное значение и меры борьбы. [Fungi injurious to forest trees in the Caucasus, their economic importance and control.]—*U.S.S.R. Central Forestry Res. Inst. Bull.* 2 (*Problems of Forest Protection*), Leningrad, pp. 7–42, 20 figs., 2 diags., 1934. [English summary.]

In this detailed report of his phytopathological survey in 1930–1 of the forests of the Black Sea littoral of the Caucasus, the author gives comprehensive notes on the fungi causing injury to the trees (arranged by the hosts), among which the following may be mentioned. A brief description (with Latin diagnosis) is given of *Ceratostomella buxi* n. sp., which causes a blue stain of the wood of *Buxus sempervirens*; the fungus is characterized by globular perithecia, 300 to 350 μ in diameter, covered with sparse reddish hairs and provided with a beak (occasionally two) measuring 300 to 560 by 30 to 55 μ. The asci are hyaline, clavate, 15 to 22·5 by 4·5 to 6 μ, and contain hyaline, cylindrical, slightly bent spores, 3 to 6 by 0·75 to 1·5 μ in diameter. The other fungi found on this host include *Poria ferruginosa* [*Fomes ferruginosus*] and *Rosellinia aquila* [cf. *R.A.M.*, viii, p. 378]. *F. rimosus* [ibid., xii, p. 254] is reported as a parasite on *Pistacia mutica* [*P. terebinthus*] and *F. fomentarius* [ibid., xii, p. 343], *F. applanatus* [*Ganoderma applanatum*: ibid., xiii, p. 604], *Hydnum ochraceum* [ibid., xi, p. 497], and *Polyporus fumosus* [ibid., xi, p. 684] on the walnut (*Juglans regia*), *F. fomentarius* being the chief local parasite of this host. Chestnuts (*Castanea vesca*) were severely injured by *P. sulphureus* [ibid., xii, p. 795], which sometimes affected 60 per cent. of the stand and was also destructive to the yew (*Taxus baccata*). About 30 per cent. of the *Juniperus excelsa* stands were found to be severely attacked by *F. juniperinus* [ibid., x, p. 571], while *F. ribis* [ibid., x, p. 271] was recorded on pear.

The Elm disease in New York and New Jersey.—*Science*, N.S., lxxx, 2070, p. 200, 1934.

Of the $150,000 appropriated by the New York State Legislature for the control of the Dutch elm disease [*Ceratostomella ulmi*] in the State [*R.A.M.*, xiii, p. 811], $142,500 has been allocated to the Department of Agriculture and Markets for the actual work of eradication and the remaining $12,500 to the State College of Agriculture, Cornell University, for research on the disease. The number of infected trees in New Jersey was found to be unexpectedly large and 1,000,000 in the Essex, Union, and Hudson counties are reported to be threatened owing to lack of Federal funds for their treatment. The legislature has appropriated $30,000 for the destruction of diseased elms, of which 731 have already been felled. It is estimated by the Secretary of Agriculture that a minimum of $250,000 will be required for this purpose during the present and coming fiscal years. It is proposed to use the balance of the Federal and State funds available to establish a barrier zone five to ten miles wide round the infected area, removing elms in that sector to prevent the extension of the disease and leaving those within the infected radius to their fate. A recent statement by L. A. Strong, chief of the Bureau of Entomology and Plant Quarantine, is quoted, urging the need for a vigorous and consistent eradication campaign to save the American elm from extinction.

Jacot (A. P.). **Acarina as possible vectors of the Dutch Elm disease.**—*Journ. Econ. Entom.*, xxvii, 4, pp. 858–859, 1934. [Abs. in *Rev. Appl. Entom.*, Ser. A, xxii, 11, p. 649, 1934.]

Certain irregularities in the transmission of *Ceratostomella ulmi* by *Scolytus multistriatus* suggest the implication of another independent factor in the spread of Dutch elm disease, trees affected by which have been found in the United States [see preceding abstract] without showing any trace of Scolytids. Most of the ten species of mites commonly found in elm bark can probably be eliminated as carriers of the fungus, but Tyroglyphids attach themselves in the 'wandering nymph' stage to other arthropods for transport to a fresh tree or locality. As many as thirty of these mites, which are known to be numerous at times on the coremial beds of *C. ulmi* in the egg tunnels of *Scolytus* and *Hylastes* (*Hylurgopinus*), have sometimes been found adhering to a single adult of *S. multistriatus*, while up to six or seven Gamasoid mites may be found on the beetle *Eutetrapha* (*Saperda*) *tridentata*, which is common on elms.

United States Department of Agriculture. Bureau of Plant Quarantine. Service and regulatory announcements, April–June, 1934. Quarantine and other official announcements.—pp. 33–35, 38–55, 1934.

In a second revision (15th May, 1934) of the classification of *Berberis* and *Mahonia* under the black stem rust [*Puccinia graminis*] quarantine (No. 38) [cf. *R.A.M.*, xii, p. 400], *B. gilgiana* and *B. sanguinea*, formerly placed in the doubtful list (group D), are transferred to the resistant category (group B).

A Press notice dated 26th June, 1934, states that two major units of the United States Department of Agriculture, the Bureau of Entomo-

logy and the Bureau of Plant Quarantine, have been merged into a single Bureau of Entomology and Plant Quarantine. K. F. Kellerman, formerly associate-in-chief of the Bureau of Plant Industry, will be entrusted under the new organization with the activities relating to the eradication and control of citrus canker [*Pseudomonas citri*: see next abstract], phony peach disease [ibid., xiii, p. 671], Dutch elm disease [*Ceratostomella ulmi*: see preceding page], white pine blister rust [*Cronartium ribicola*: ibid., xii, p. 400], and stem [black] rust of grains [*P. graminis*].

Summaries are given of the plant quarantine import restrictions obtaining in the Philippine Islands, French Mandate of Syria, British Honduras, Jamaica, Norway, Peru, New Zealand (Samoa), and the Commonwealth of Australia. In a footnote to the Norwegian regulations for the exclusion of potato wart (*Synchytrium endobioticum*) [ibid., xiii, p. 672], it is stated that the importation into Norway of potatoes grown in the United States is prohibited on account of the localized presence of the disease in several States [ibid., viii, p. 123; xii, p. 51]. The Australian regulations against the introduction of fireblight (*Bacillus amylovorus*) [ibid., iv, p. 384] are amended, as from 18th April, 1934, to the following effect. The importation into Australia is prohibited of deciduous fruit trees or parts thereof, and Rosaceous plants or parts thereof, grown in any country where fireblight is known to exist, except New Zealand, whence apples may be conditionally imported from districts free from the disease [ibid., xi, p. 184]. Permission may further be granted, at the discretion of the Minister of Health, for the importation of ornamental plants or of new or special varieties of deciduous fruit trees.

United States Department of Agriculture. Bureau of Entomology and Plant Quarantine. Revision of notice of Quarantine No. 19 on account of Citrus canker and other Citrus diseases.—3 pp., 1934. [Mimeographed.]

As from 1st September, 1934, the scope of Quarantine No. 19 on account of citrus canker [*Pseudomonas citri*: *R.A.M.*, xi, p. 752; xii, p. 433] has been considerably modified by the release from prohibition of entry into the United States of all members of the sub-family Citratae of the family Rutaceae except those comprised in the single tribe Citrinae, including the ordinary citrus species and their near botanical relatives. A number of the plants thus accorded entry are cultivated as ornamentals in the southern States; their admission will still be subject to the provisions of Quarantine No. 37, regulating commerce in nursery stock, plants, and seeds [ibid., ix, p. 688; xii, p. 335].

Amtliche Pflanzenschutzbestimmungen. [Official plant protection regulations.]—*Beil. Nachrichtenbl. Deutsch. Pflanzenschutzdienst*, vi, 6, p. 120, 1934.

AUSTRIA. As from 13th March, 1934, the existing regulations for the importation of potatoes into Austria are amended to permit under proper official safeguards the entry of consignments from the following countries deemed to be free from wart disease [*Synchytrium endobioticum*: *R.A.M.*, x, p. 560]: Egypt, Italy, Jugo-Slavia, the islands of Malta [ibid., xiii, p. 799] and Cyprus, Spain, and Hungary.